

# THE AMERICAN PSYCHOLOGIST

THE AMERICAN PSYCHOLOGICAL ASSOCIATION, INC.

## GENERAL ANNOUNCEMENTS

**HOUSING RESERVATIONS:** Reservations for rooms should be requested immediately, the better rooms going to those applying first. There are no unreserved rooms remaining in the two local hotels.

**TRANSPORTATION:** *Automobile.* State College is in about the center of Pennsylvania on U. S. Highway 322 east and west, and Pennsylvania Highway 45 north and south. Fifty miles per hour is the speed limit. On the campus, overnight parking space will be available. Although the parking spaces will be patrolled, guests are cautioned to lock their cars.

*Airways.* Regular passenger plane service at the State College Airport may not be available because of contemplated alterations to the landing field. Possibility of landing at State College should be checked at the point of origin of the flight. Regular passenger plane service is afforded at Harrisburg, Pittsburgh, and Lock Haven which is 33 miles to the northwest. Buses leave Lock Haven for State College daily at 7:24 A.M., 9:45 A.M., 4:00 P.M., and 9:00 P.M., Eastern Standard Time.

*Railroads.* State College is off the east-west main line of the Pennsylvania Railroad. Passengers from the east should get off at Lewistown railroad station. Passengers from the west should get off at the Altoona railroad station.

Bus service from the Lewistown railroad station to State College will be as follows (Eastern Standard Time):

### *Leaves Lewistown*

11:55 A.M. Daily.  
2:00 P.M. Sunday, Sept. 3rd.  
2:30 P.M. Monday and Tuesday, Sept. 4th and 5th.  
6:35 P.M. Daily.  
10:00 P.M. Friday through Tuesday, Sept. 1st-5th, inclusive.

Additional buses can be run if necessary.

Bus service from the Altoona railroad station to State College will be as follows, Eastern Standard Time (the Greyhound Bus Station is adjacent to the railroad station):

### *Leaves Altoona*

Greyhound Bus 4:39 A.M. Daily.  
Greyhound Bus 10:39 A.M. Daily.  
Chartered Bus 12:00 Noon. Sunday, Monday and Tuesday, Sept. 3rd, 4th, and 5th.  
Greyhound Bus 4:09 P.M. Daily.  
Greyhound Bus 11:04 P.M. Daily.

Additional chartered buses can be run from Altoona if early experience shows them necessary, but the ones listed meet all but the slower trains.

Passengers on the Pennsylvania Railroad line from the north via Buffalo should use the station at Williamsport or Lock Haven.

**DEPARTURE FROM STATE COLLEGE:** Railroad reservations can probably be made at McElwain Hall. There will be a bulletin board for announcement of car pools. Buses can be run as needed.

**WEATHER:** For September 4 to 8 the average daily *maximum* temperature is 77 degrees. The average *minimum* temperature is 54 degrees. The weather is ordinarily pleasant in early September, with two-thirds of the days sunny.

**REGISTRATION:** If you have not registered, please go directly to headquarters in the lobby on the first floor of McElwain Hall. Those who have registered can go directly to their rooms. Information and a registry of those attending the meeting will be available at headquarters.

The registration fee for non-members is \$2.00.

**TICKETS FOR SPECIAL LUNCHEONS AND DINNERS:** Tickets for special luncheons and dinners should be purchased at the registration desk as soon after arrival as possible.

**LOCAL INFORMATION:** A bulletin on local information and services will be distributed at headquarters. The facilities of the nursery school and the golf course will be available. Rooms and other arrangements for special meetings or conferences can be requested at headquarters. Requests by mail should be addressed to the Department of Psychology, The Pennsylvania State College, State College, Pennsylvania.

**PRESS ROOM:** A press room will be located off the lobby on the first floor of McElwain Hall.

**PERSONNEL PLACEMENT SYSTEM:** The placement office of the American Psychological Association will be located in a lounge on the second floor of McElwain Hall.

**LOCATION OF MEETING ROOMS:** A map of the campus is printed on page 239. It shows the buildings where the meetings are being held.

**EXHIBITS:** Exhibits of books and psychological apparatus will be located just off the lobby on the first floor of McElwain Hall.

# THE AMERICAN PSYCHOLOGIST

The Professional Journal of the American Psychological Association, Inc.

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*Managing Editor:* Helen M. Wolfe

*Consulting Editors:* Theodore M. Newcomb, Robert R. Sears, and Ruth S. Tolman

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## PUBLICATIONS OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION

### AMERICAN PSYCHOLOGIST

*Managing Editor:* HELEN M. WOLFLE, *American Psychological Association*. Contains all official papers of the Association and articles concerning psychology as a profession; monthly.

Subscription: \$7.00 (Foreign \$7.50). Single copies, \$.75.

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Subscription: \$6.00 (Foreign \$6.50). Single copies, \$1.75.

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Subscription: \$6.00 (Foreign \$6.50). Single copies, \$1.25.

### JOURNAL OF COMPARATIVE AND PHYSIOLOGICAL PSYCHOLOGY

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### JOURNAL OF CONSULTING PSYCHOLOGY

*Editor:* LAURANCE F. SHAFFER, *Teachers College, Columbia University*. Contains articles in the field of clinical and consulting psychology, counseling and guidance; bi-monthly.

Subscription: \$5.00 (Foreign \$5.50). Single copies, \$1.00.

### JOURNAL OF EXPERIMENTAL PSYCHOLOGY

*Editor:* FRANCIS W. IRWIN, *University of Pennsylvania*. Contains original contributions of an experimental character; bi-monthly.

Subscription: \$7.00 (Foreign \$7.50). Single copies, \$1.25.

### PSYCHOLOGICAL ABSTRACTS

*Editor:* C. M. LOUTTIT, *University of Illinois, Urbana, Illinois*. Contains noncritical abstracts of the world's literature in psychology and related subjects; monthly.

Subscription: \$7.00 (Foreign \$7.50). Single copies, \$.75.

### PSYCHOLOGICAL BULLETIN

*Editor:* LYLE H. LANIER, *New York University*. Contains critical reviews of books and articles and critical and analytic summaries of psychological fields or subject matter; bi-monthly.

Subscription: \$7.00 (Foreign \$7.50). Single copies, \$1.25.

### PSYCHOLOGICAL MONOGRAPHS: GENERAL AND APPLIED

*Editor:* HERBERT S. CONRAD, *U. S. Office of Education*. Contains longer researches and laboratory studies which appear as units; published at irregular interval, about eight numbers per year.

Subscription: \$6.00 per volume (Foreign \$6.50). Single copies, price varies according to size.

### PSYCHOLOGICAL REVIEW

*Editor:* CARROLL C. PRATT, *Princeton University*. Contains original contributions of a theoretical nature; bi-monthly.

Subscription: \$5.50 (Foreign \$6.00). Single copies, \$1.00.

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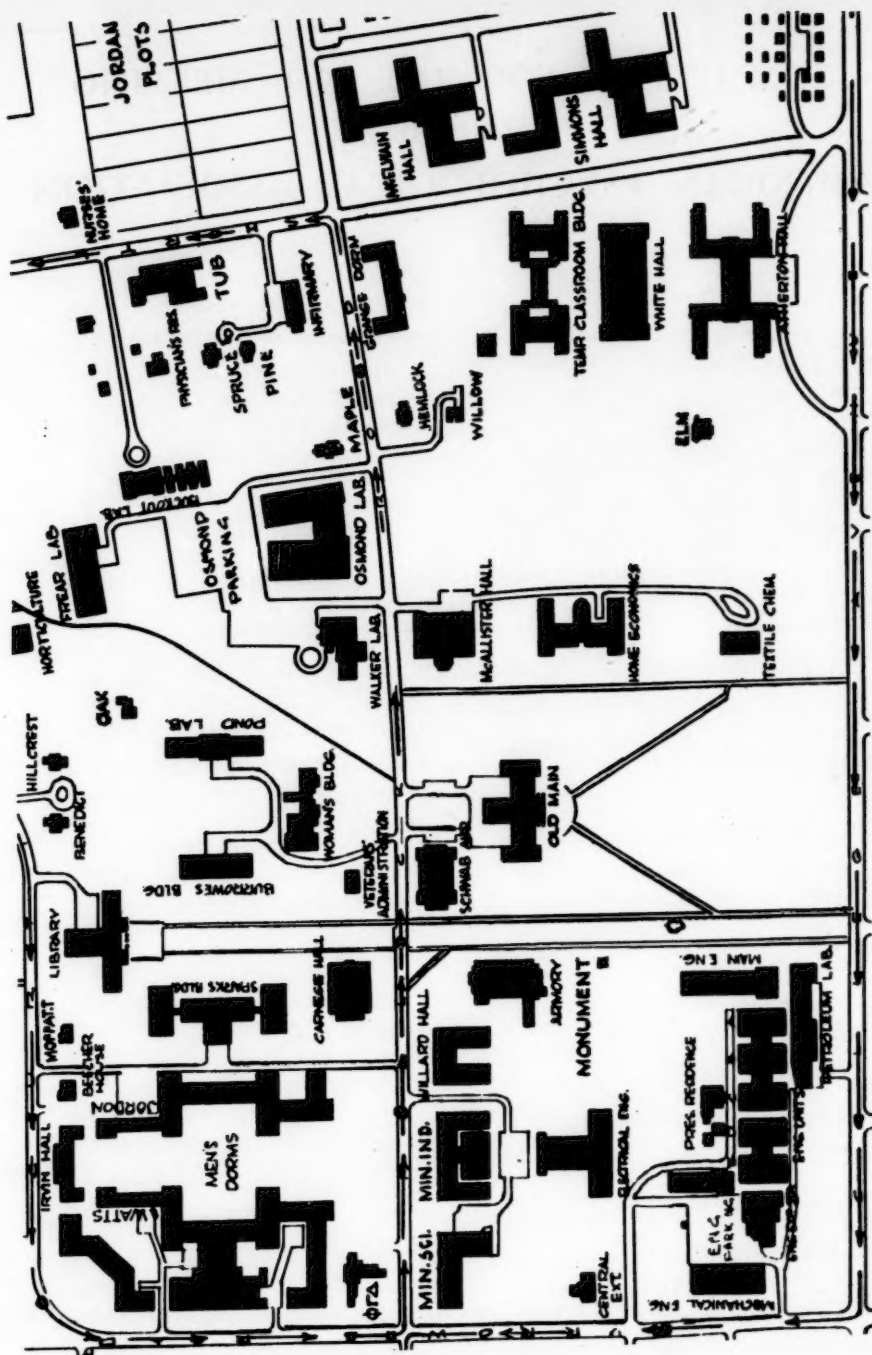
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PENNSYLVANIA STATE COLLEGE

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# COMMITTEES FOR THE 1950 MEETING OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION

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## PROGRAM

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### AMERICAN PSYCHOLOGICAL ASSOCIATION

#### COMMITTEE OF UNIVERSITY DEPARTMENT CHAIRMEN

*Saturday and Sunday, Willard Hall 106*

WAYNE DENNIS, Chairman

#### BOARD OF DIRECTORS, APA

*9:30 AM, Sunday, McElwain*

J. P. GUILFORD, President

#### OPEN MEETING OF THE COMMITTEE ON ETHICAL STANDARDS FOR PSYCHOLOGY

Ethical Standards for the Clinical Area

*1:40-3:50 PM, Sunday, Auditorium*

NICHOLAS HOBBS, Chairman

Small groups will meet in Willard Hall classrooms following the meeting in the Auditorium.

#### JOINT MEETING OF COMMITTEE ON PUBLICATIONS AND BOARD OF EDITORS

*8 PM, Monday, McElwain*

WAYNE DENNIS, Chairman

#### FILM SHOWINGS ARRANGED BY COMMITTEE ON AUDIO- VISUAL AIDS

Film showings and related demonstrations of audio-visual aids will be mainly centered at Willard Hall. Regularly scheduled film showings, listed below in this program, will be held in Rooms 203 and 217. These programs will be repeated again later in the week if demand for any program exceeds the seating capacity of the room. Several other nearby rooms in Willard Hall will also be continuously available, including evenings, and equipped for request showings from a quite complete roster of psychological films. Members should note that this is probably the last year in the foreseeable future that

it will be feasible to provide comparable opportunity at an APA convention for viewing films on request from a full repertoire of psychological films. Make requests, preferably in advance, at booking desk located near the bulletin board outside Room 217, where mimeographed lists of available films will be on hand. Any changes in the programmed showings, and announcements of special requested showings will be posted on the bulletin board outside Room 217.

In addition to the programs in Willard Hall, there will be 45-minute demonstrations of "film analyzer" equipment ("classroom communicator"), daily, Monday through Friday, at 2 PM and 3 PM in Room 308 Burrowes Building, by staff members of the Penn State Film Research Project.

#### SESSION I: RECENT PSYCHOLOGICAL FILMS

*9:00 AM, Monday and Wednesday, Willard 217*

9:00 AM R. F. Becker. *Asphyxia Neonatum—An Experimental Study in the Guinea Pig.*

9:20 AM W. Freeman. *Transorbital Lobotomy.*

9:40 AM K. K. Bose. *Functions of the Nervous System.*

10:00 AM K. J. Hayes. *Vocalization in Chimpanzees.*

10:15 AM D. B. Lindsley and W. H. Sassaman. *"Voluntary" Control of Hair Raising with Associated Autonomic Phenomena.*

10:30 AM H. T. Bachelder, advisor. *The Importance of Goals.* (Educational Psychology Series: McGraw-Hill)

10:55 AM A. E. Bennett and L. G. McKeever. *Antabuse (Drug Treatment of Alcoholism).*

#### SESSION II: SPECIAL FILM AND RECORDING PROGRAM

*9:00 AM, Monday and Wednesday, Willard 203*

9:00 AM J. Dollard. *Sound Recordings of Therapeutic Interviews as an Aid to Teaching and Research (demonstration).*

10:10 AM V. Bernard, advisor. *The Quiet One.*

**SESSION III: RECENT FILMS BY, AND OF, AMERICAN PSYCHOLOGISTS**

2:00 PM, Monday and Wednesday, Willard 217

- 2:00 PM L. F. Beck. *Hypnotic Behavior*.  
 2:35 PM L. F. Beck. *Unconscious Motivation*.  
 3:35 PM D. B. Lindsley. *Psychologists Here, There, Everywhere* (Recent movie shots of APA members).  
 3:55 PM L. F. Beck et al. Other film sequences of American and foreign psychologists.

**SESSION IV: FILMS ON MARITAL ADJUSTMENT AND ON SEX EDUCATION**

2:00 PM, Monday and Wednesday, Willard 203

- 2:00 PM Henry Bowman, advisor. *This Charming Couple*. (McGraw-Hill)  
 2:25 PM L. F. Beck. *Human Beginnings*. (Designed for 6-year-olds.)  
 3:05 PM L. F. Beck. *Human Growth*. (Designed for adolescents.)  
 3:35 PM Encyclopedia Britannica. *Human Reproduction*. (Designed for adults.)  
 3:50 PM McGraw-Hill. *Reproduction among Mammals*.

**SESSION V: THE INSTRUCTIONAL VALUE OF TRAINING FILMS**

9:00 AM, Tuesday and Thursday, Willard 217

- 9:00 AM D. M. Neu. "Attention Getting Devices" in films  
 9:20 AM J. Tyo. "Authentic Sound Effects" in films  
 9:35 AM J. V. Zuckerman. *Commentary Variables in Instructional Films*  
 9:50 AM S. M. Roshal. *Variables Relating to Learner Representation in Films*  
 10:15 AM A. I. Gladstone and A. A. Lumsdaine. *Participation, Pictorial and Sound Effects in a Film Strip*  
 10:30 AM R. L. Sulzer and A. A. Lumsdaine. *Animation, Action and Repetition in a Training Film*  
 10:50 AM E. Abramson. *Use of Protagonist in a "Filmagraph" Designed for Restructuring Racial Attitudes*

**SESSION VI: RECENT FILMS ON CHILD DEVELOPMENT AND ADJUSTMENT**

9:00 AM, Tuesday and Thursday, Willard 203

- 2:00 PM E. B. Hurlock. *Social Development* (McGraw-Hill Child Development Series)

2:20 PM E. B. Hurlock. *Principles of Development* (McGraw-Hill)

2:40 PM Zachry Institute of Human Development. *Understanding Children's Play*

3:00 PM H. D. Behrens. *A Study of Human Development, Part Four* (3 years to 5 years)

3:20 PM D. E. Cameron and C. G. Stogdill. *Overdependency*

3:55 PM R. A. Spitz. *Genesis of Emotions*

**LUNCHEON FOR THE SECRETARIES AND NEWLY ELECTED SECRETARIES OF THE APA DIVISIONS**

12:30 PM, Monday, Nittany Lion Inn

**BUSINESS MEETING OF CONFERENCE OF STATE PSYCHOLOGICAL ASSOCIATIONS**

8:50 AM-12:10 PM, Tuesday, Willard 108

NOBLE H. KELLEY, Chairman

**ROUND TABLE: APA BY-LAW CHANGES RECOMMENDED BY THE POLICY AND PLANNING BOARD**

4:00-6:00 PM, Tuesday, Sparks 121

**ADDRESS OF THE PRESIDENT OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION**

8:15 PM, Tuesday, Recreation Hall

ERNEST R. HILGARD, Chairman

ADRIAN O. MORSE, Assistant to the President of Pennsylvania State College.

*Address of Welcome.*

J. P. GUILFORD. *Creativity*.

**RECEPTION AND INFORMAL DANCE FOR THE AMERICAN PSYCHOLOGICAL ASSOCIATION**

9:30 PM, Tuesday, Recreation Hall

**ADDRESS BY INVITATION**

4:00-5:00 PM, Wednesday, Sparks 121

NORMAN C. MEIER, Chairman

VIKTOR LOWENFELD. *The Art of the Blind and Its Psycho-Aesthetic Implications*.

**SYMPOSIUM: FUNCTIONS OF STATE ASSOCIATIONS IN THE DEVELOPMENT OF THE PROFESSION OF PSYCHOLOGY**

4:00-6:00 PM, Wednesday, Elec. Engr. 110

Sponsored by the Conference of State Psychological Associations

NOBLE H. KELLEY, Chairman

**FIRST SESSION, MEETING OF THE COUNCIL OF REPRESENTATIVES OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION**

8:00 PM, Wednesday, Little Theatre

J. P. GUILFORD, President

**ADDRESS BY INVITATION**

8:30 PM, Wednesday, Auditorium

DONALD B. LINDSLEY, Chairman

RALPH E. HIMSTEAD, General Secretary of the American Association of University Professors. *Academic Freedom and the Psychologist.*

**SECOND SESSION, COUNCIL OF REPRESENTATIVES OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION**

1:40-5:00 PM, Thursday, Little Theatre

J. P. GUILFORD, President

**STUDENT AFFILIATE MEETING**

5:00-6:00 PM, Thursday, Osmond 117

WALTER C. SHIPLEY, Chairman

**DIVISION OF GENERAL PSYCHOLOGY**

**SYMPOSIUM: CONCEPTUAL TRENDS**

8:50-11:00 AM, Tuesday, Osmond 117

DELOS D. WICKENS, Chairman

Participants:

E. E. GHISELLI. In industrial psychology.

CLARENCE H. GRAHAM. In perception.

B. J. UNDERWOOD. In learning.

HOWARD F. HUNT. In psychodiagnostics.

**BUSINESS MEETING**

11:10 AM-12:10 PM, Tuesday, Osmond 117

Item of special business: *The Place of the General Division in the APA*

EDNA HEIDBREDER, Chairman

**ANNUAL REPORT TO THE MEMBERS OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION**

8:30 PM, Thursday, Auditorium

J. P. GUILFORD, President

CARROLL L. SHARTLE. *APA Finances and the 1951 Budget.*

DOROTHY C. ADKINS. *Major Decisions of the 1950 APA Council Meeting.*

DAEL WOLFLE. *Annual Report of the Executive Secretary.*

DONALD B. LINDSLEY, LESTER F. BECK, AND OTHERS. *Film Program: Psychologists Here, There, and Everywhere.*

**MEETING OF THE POLICY AND PLANNING BOARD**

1:40-3:50 PM, Friday, Willard 108

LYLE H. LANIER, Chairman

**THE APA COMMITTEE ON PSYCHOLOGICAL SERVICE CENTERS**

1:40-3:50 PM, Friday, Little Theatre

JERRY W. CARTER, JR., Chairman

Participants: IRWIN A. BERG, KARL F. HEISER, NATHAN KOHN, BERTHA M. LUCKEY, A. C. VAN DUSEN, and C. GILBERT WRENN

A discussion of the issues, problems, and possible solutions concerning the evaluation of psychological services.

**GENERAL PSYCHOLOGY**

8:50-10:30 AM, Thursday, Osmond 119

EDNA HEIDBREDER, Chairman

**LEARNING**

8:50 AM Sonic and ultrasonic effects on maze learning and retention in the albino rat: I. Effects of high intensity sounds. PETER F. GILBERT and GARY C. GAWAIN, *Pennsylvania State College.*

PROBLEM: To determine the effects of high intensity sounds on maze learning and retention in albino rats. SUBJECTS: Sixty-two albino rats; 67-72 days of age. PROCEDURE: (1) Animals starved 44 hours immediately prior beginning training. (2) Six animals randomly placed, one at 'control' and one at each of the

5 'experimental' sound-levels (110, 120, 130, 137, and 147 db.). Exposure was for 1.5 min. Frequency kept constant at 6 kc. during exposure. 'Control' animals treated same as 'experimental' animals, except siren was not turned on. (3) Errors, time, trial scores recorded. Recorder did not know identity of animal for which he was recording. (4) On first day animals were trained to run Warner-Warden Standard Unit Maze, linear pattern (RLRLRL) with six cul-de-sacs to meet criterion of 3 out of 4 errorless trials. (5) On second day animals were exposed to experimental variables; 3 minutes after exposure they were re-run on the same maze they learned the first day to meet same criterion. Designed to determine effects on retention. (6) On third day, animals trained on the Warner-Warden maze, but pattern was changed (LLRRLR). Animals trained to meet criterion of 3 out of 4 errorless trials. Designed to determine effects on new learning.

Steps 1 through 6 were repeated every 3 days with new sets of animals until an N of 62 was obtained. To stabilize means at control level, two extra control groups were run.

**RESULTS:** The data were treated by analysis of variance. On new learning, when mean errors of controls as one group were compared with mean errors of all experimental animals as another group, F-test was significant at 0.025 level of confidence. Experimental animals exposed to high intensity sounds made, on the average, significantly more errors than did control animals which were not exposed to sound. F-tests for time and trial scores for these same animals (control versus all experimental) on new learning were significant at 0.10 level of confidence. Analysis of variance showed predominantly negative results on retention.

9:05 AM The effect of an emphasisizer on the learning of nonsense syllables at different rates of presentation. F. NOWELL JONES, *University of California at Los Angeles*, and MARY ANN BROWN, *Tacoma Public Schools*.

**PROBLEM:** To determine whether or not the facilitating effect of an 'emphasized' syllable in a list of nonsense syllables varies with the rate of presentation.

**SUBJECTS:** Seventy-two college students, approximately evenly divided as to sex.

**PROCEDURE:** Every S just learned by the anticipation method a 5 and a 9 syllable practice list, presented at the rate of 2 sec. per syllable. The S's were then divided into two groups: Group I learned three 9 syllable lists at the rate of 1, 2, and 3 sec. per syllable, with no 'emphasized' syllable. Since there are 6 permutations of 3 lists, the possible orders were used in rotation. Group II learned the same lists but with the sixth syllable 'emphasized,' i.e. printed in red.

Comparisons were then made between the 2 groups as to speed of learning the lists at the 3 speeds, and the effect of the emphasized item was compared for the 3 speeds.

**RESULTS:** For the 1- and 2-sec. rates, little effect of speed on ease of learning the total lists was noted. For the 3-sec. rate, the emphasized list was learned more rapidly ( $p = 0.05$ ). At all speeds, the emphasized syllable was learned more rapidly than its counterpart in the normal list. At the 1-sec. rate little effect on syllables other than the isolated one was noted. At the other two speeds, the average percentage of correct anticipations for the unemphasized syllables fell, except for the syllable immediately following the emphasized one. These results are discussed in relationship to previous studies of the effect of emphasized syllables.

### PERCEPTION

9:20 AM Odor mixtures. DEAN FOSTER and E. H. SCOFIELD, *Joseph E. Seagram & Sons, Inc.*

If an adequate theory of olfaction is developed in the near future, it will likely spring from experimentation with odor mixtures. Since actual mixing of odorants in all proportions is prohibitively slow, the development of mixing apparatus is the first essential. A new instrument for mixing odorous vapors is described which makes possible combinations of two, three, or four odors in any desired proportions for dirhnic or dichorhnic stimulation.

The thesis is developed that one of the most fertile approaches to the question of the existence of odor primaries can be made by way of the study of mixtures. Both quantitative and qualitative determinations are presented showing that the resultants of the mixtures of a number of known odorants now can be predicted.

The quantitative explorations include a comparison of independence thresholds with absolute thresholds of single and mixed odors. The independence threshold, as the name suggests, is conducted while the observer is completely adapted to a second odor. It is believed that the qualitative relationship of the two odors will dictate whether the threshold is raised or lowered by such adaptation. The threshold of a mixture is similarly influenced by the qualitative relation of the components. The frequently observed psychophysical anomaly of increased intensity with stimulus dilution is operant in mixtures and helps account for some of the effects described.

On the qualitative side, it is shown that almost any pair of odors when mixed in appropriate proportions produces a blend perceptually unlike the components. Some odorant pairs fuse more readily than others and, in general, pure odors blend more readily than

impure ones. Both thresholds and quality are essential to predictions.

In conclusion, it is pointed out that olfactory theory may be advanced by study of the phenomena of masking, compensation, and neutralization under the precisely controlled conditions described.

9:35 AM Space perception and orientation in the blind. PHILIP WORCHEL, *University of Texas*.

PROBLEM: To determine (1) the ability of the blind to perceive spatial relations, and (2) the relative rôle of visual and tactile-kinesthetic organs in space perception.

SUBJECTS: Two groups of Ss were used in the present experiment. Group I consisted of 33 totally blind Ss, 19 females and 14 males, whose chronological ages varied from 8 to 21 yr. (mean, 14.67 yr.), and age at blindness varied from birth to 11 yr. Group II consisted of 33 sighted students matched on the basis of age and sex with the blind Ss.

PROCEDURE: Three series of experiments were given to both groups of blindfolded Ss. The first series dealt with tactile-kinesthetic form perception. The methods of reproduction, verbal report, and recognition were employed. In the second series of experiments the perception of space relations was studied by presenting a block to each hand and asking S, "What shape would result if the blocks were placed together." The S was to select one of four blocks which represented the correct response. The space orientation test in the third series consisted in leading the S in a right angular path and requesting that he return to the starting point along an hypotenuse. RESULTS: (1) In tactile-kinesthetic form perception, the sighted were superior to the blind Ss in the methods of reproduction, but no significant differences appeared in the methods of verbal report and recognition. (2) In space relations and orientation, the results of the sighted Ss were significantly better than those of the blind Ss.

Detailed fractionation of the results on the basis of sex, chronological age, and age at blindness shows important differences in each of the factors studied.

## SOCIAL

10:00 AM A study of attitudes toward war as held and developed by civilian females during peace and during war. KEY L. BARKLEY, *North Carolina State College*.

PURPOSE: To measure attitudes toward war as held by younger American women during the periods of peace before and after the war, and during the period of the war.

SUBJECTS: Representative groups of women students from a Southern College were tested each year from

1935 to 1950. A group of veterans' wives was tested in the period of peace after the war.

PROCEDURE: The Thurstone-Droba Scale for Measuring Attitude Toward War was given to students taken from the classes of 1939 and 1943 at the beginning of their freshman year, and then repeated at the end of each of their college years thereafter. Other groups of students were tested each year from 1945 to 1950. The wives of veterans were tested in 1950.

The scores made by students of the classes of '39 and '43 were treated to show the changes in attitude during the period of peace from 1935 to 1939, or during the period of war from 1939 to 1943. The scores of the other groups were found to see what attitudes have been characteristic since the end of the war. The influence of the condition of being married to a veteran was studied in case of the married women.

RESULTS: (1) Greater changes in attitude toward war occurred during the war than in the period of peace before the war. (2) The change during pre-war peace was toward a more pacifistic attitude; the change during war was toward a less pacifistic attitude. (3) Since the war, female students tend to have a less pacifistic attitude than was held by comparable groups before the war. (4) Wives of veterans are no more opposed to war than are single women.

10:15 AM Empiric regularities in the frequency-distribution of directorships in American corporations. GEORGE K. ZIPF, *Harvard University*.

PROBLEM: (a) The relationship between the  $x$ -number of persons in the U.S.A. (1949) who were directors in the same  $y$ -number of corporations, and the size of  $y$ . (b) The relationship between the population-sizes of cities and the number of directors resident therein.

SUBJECT: *Poor's Register of Directors and Executives, 1949*, New York: Standard and Poor's Corporation, 1949.

PROCEDURE: Statistical sampling and curve fitting by least squares.

RESULTS: Rectilinear correlations on doubly logarithmic coördinates.

## SYMPOSIUM: ETHICAL STANDARDS FOR PSYCHOLOGICAL RESEARCH

10:00 AM-12:10 PM, Friday, Osmond 117

STUART W. COOK, Chairman

Participants:

FRANCIS W. IRWIN. In experimental psychology.

J. McV. HUNT. In clinical psychology.

RENSIS LIKERT. In social psychology.

JOHN C. FLANAGAN. In industrial psychology.

### SYMPOSIUM: MULTIPLE-PROCESS CONCEPTIONS OF LEARNING

1:40-3:50 PM, Friday, Osmond 119

M. E. BITTERMAN, Chairman

- O. HOBART MOWRER. Further evidence for a two-factor theory of learning.  
H. G. BIRCH. Sensory integration and the problems of cognitive theory.  
FRED D. SHEFFIELD. The contiguity principle and learning theory.

HOWARD H. KENDLER. The superiority of a single-factor theory over the two-factor theories of learning.

Discussants: NEAL E. MILLER and BENBOW F. RITCHIE

### PRESIDENTIAL ADDRESS

4:00-5:00 PM, Friday, Osmond 119

ROBERT H. SEASHORE, Chairman

EDNA HEIDBREDER. *Conceptual Achievements and Perceptual Support.*

## DIVISION ON THE TEACHING OF PSYCHOLOGY

### SOME PROBLEMS IN TEACHING PSYCHOLOGY

8:50-9:50 AM, Tuesday, Osmond 119

NORMAN L. MUNN, Chairman

- 8:50 AM Predicting student performance in the first course in psychology. SLATER E. NEWMAN, CARL P. DUNCAN, KENNETH H. BRADT and GRAHAM B. BELL, *Northwestern University.*

PROBLEM: To evaluate the predictive power for performance in psychology of (1) a test, true-false, of 100 misconceptions, (2) a multiple-choice achievement examination in psychology.

SUBJECTS: 136 students in two classes of the introductory course in psychology.

PROCEDURE: 74 of the students were examined on Buxton's test of misconceptions at the first meeting of the class. To the other 62 students was administered a typical achievement examination in psychology. The criterion measure was total points on the three departmental examinations based exclusively on material to be found in the textbook. Pearson product-moment coefficients of correlation were computed.

RESULTS: Data are presented on the reliability of the two predictive tests and the criterion measure. The correlations between each of the two predictive tests and the criterion are reported. Also, the correlation between the Ohio State Psychological Examination and the criterion is presented.

CONCLUSIONS: Among others the following conclusions were drawn: (1) Student performance in the first course in psychology can to some extent be predicted by either an achievement test or Buxton's test of misconceptions. (2) The achievement test predicts better than the test of misconceptions but not significantly so.

- 9:05 AM An evaluation of students' reactions to eight cases in a human relations course taught by the case-method. GEORGE F. CASTORE, *Colgate University.*

PROBLEM: To evaluate the reactions of three sections in a human relations course to the case-method of instruction on the first, second, and third days discussion.

SUBJECTS: Ninety-two male students enrolled in three sections of a human relations course during the Spring Semester of 1949 at Colgate University.

PROCEDURE: A six-item rating scale was devised. The items were: (1) This discussion was constructive; (2) Problems were clarified as the case advanced; (3) Instructor influenced the discussion; (4) I thought deeply about the case today; (5) I participated in class discussion; (6) Outside affairs reduced my interest. Any of seven ratings from "not at all" to "very much" could be given to each item. The students checked a rating slip at the end of each class period. Reliability and validity were established for the instrument. Intercorrelations were computed for each section independently. First day's ratings were compared to second and third day's ratings. Ratings for each section were compared. Trends for the semester were noted. Other variables which were given attention relative to the ratings were all-college average, course grade, amount of participation in class discussion, and sociometric ratings.

CONCLUSION: In general, previous feelings of the instructors were supported as a belief that second days on cases were less stimulating than first days or that the value of cases, from the students' point of view, declined about the middle of the semester.

- 9:20 AM Attempts to measure attitudinal changes as a consequence of permissive discussions. F. K. BERRIEN, *Colgate University.*

This paper will report three attempts to determine changes in student thinking and attitudes as a conse-

quence of taking a course entitled Human Relations taught largely by "permissive" discussion of instances in which interpersonal relations were disturbed. The first attempt was the administration of the Watson-Glaser Test of Critical Thinking to 89 students in 4 sections. Although significant improvement in median score occurred in one section and increased cautiousness appeared in another, no consistent change occurred in all sections. A control group not taking the course also showed improvement in median score. The second attempt employed the Rosenzweig Picture-Frustration Test with the same experimental design but with a different set of 4 course sections. Principal finding was a decrease in extrapunitive and an increase in needs-persistence for one section of 27 students. All other median scores from this test in other sections of the course and in the controls remained approximately unchanged. The third attempt required the students, shortly after the start of the course, to register individually their approval or disapproval of statements in a previously recorded class discussion. These same statements were separately rated by 4 instructors as hostile, mildly hostile, neutral, mildly defensive, or defensive. The same discussion was played back to the students at the end of the course (4 sections, 71 students). Results will be analyzed to determine the shift in approval and disapproval as related to the hostility, or defensiveness of the statements. Implications of these attempts for the measurement of attitudinal changes as a consequence of education through permissive discussion will be developed.

9:35 AM Practice teaching for M.A. candidates in psychology. CECIL M. FREEBURNE, *Bowling Green State University*.

For the past two years, a practice-teaching program for M.A. candidates in psychology has been evolving at Bowling Green. The difficulty of providing curriculum time has been met in a limited way by taking time from graduate seminars offered every semester.

The first year, six consecutive weeks were taken from the seminar in the second semester. Lectures and discussions occurred on such new-teacher problems as course objectives, methods, visual aids, class

morale and discipline, personal problems of the new teacher, and so on. Concurrently, students prepared units on the topic of learning, to be taught in introductory classes under the supervision of senior staff members. Wire recordings of the students' lectures were made for later discussion. The students also prepared their unit tests. The second year, the six weeks of the seminar devoted to practice teaching were arranged at intervals throughout the semester, allowing wider choice of topics, giving more preparation time, and making seminar discussions more profitable by virtue of the accumulating experience of class members.

As a by-product, the staff have been pleased to select one or two graduates each year to fill instructorships, for supervised job experience.

### SYMPOSIUM: PREPARATION OF COLLEGE TEACHERS OF PSYCHOLOGY

10:00 AM-12:10 PM, Tuesday, Osmond 119

CLAUDE E. BUXTON, Chairman

- A. WILSE B. WEBB. The teaching internship.  
CARL P. DUNCAN, discussant
- B. WILBERT J. McKEACHIE. Research in teaching.  
GRERORY A. KIMBLE, discussant
- C. WILBERT S. RAY. Undergraduate curriculum rationale.  
F. K. BERRIEN, FRED S. KELLER, discussants

### PRESIDENTIAL ADDRESS AND BUSINESS MEETING

4:15-5:45 PM, Tuesday, Osmond 119

NORMAN L. MUNN. *The Teaching of General Psychology*.

### SYMPOSIUM: GENERAL PSYCHOLOGY IN TEACHING EDUCATIONAL PSYCHOLOGY

1:40-3:50 PM, Wednesday, Elec. Engr. 110

(Co-sponsored with Division 15. See Division 15's program.)

## DIVISION OF EXPERIMENTAL PSYCHOLOGY

### CONDITIONING AND EXTINCTION

1:40-2:40 PM, Tuesday, Osmond 119

HULSEY CASON, Chairman

1:40 PM The effect of an interpolated learning situation on the choice of pathways in a variable

pathway maze. ZONA K. MACPHEE, *University of Delaware*.

PROBLEM: To determine whether a response learned in one situation would carry over into a different, but familiar, situation in which that response had not previously been made.

**SUBJECTS:** 16 white rats, divided into two groups of 8 each.

**PROCEDURE:** All rats ran a variable pathway 4-section maze until they were thoroughly familiar with it. In half the forward-going alleys a tone sounded, in the other half there was no tone, and the rats were allowed to choose their pathways. Both groups were then trained in a shock box to escape from shock by turning and running to the other end of the box. Group I learned a conditioned response to the same tone used in the maze. The tone was sounded for five seconds before shock was applied to the grid floor. This group was trained until they turned around and moved to the opposite end of the box before shock was applied. Group II escaped shock by running to the other end of the box as soon as shock was applied; for this group no tone was used. After the shock-box training both groups were given 10 trials in the maze.

**RESULTS:** Group I rats did not carry over into the maze the specific response of turning and running at the sound of the tone, which they had learned in the shock box. They did make a generalized avoidance response to the tone in that they used a smaller percentage of tone alleys than did Group II. (In the preliminary maze running no differences were found.) Group II rats, which could escape from shock but not avoid it, differed from Group I (and from their own earlier behavior) in that following the shock-box experience they entered more alleys, *i.e.*, took more uneconomical paths, did more wandering and random circling. The greatest difference between the groups was in the greater random behavior of the group which had no control over the shock. (Slides)

1:55 PM Extinction and the spacing of extinction trials. WALTER C. STANLEY, *Brown University*.

**PROBLEM:** The common expectation that massed extinction is more rapid than spaced is not consistently supported by experimental findings. For example, Sheffield's recent study of extinction of a running response in rats yielded results opposite to those expected from most theories and reviews. Two factors may account for divergent results: (1) perseverating drive and distinctive-stimulus effects of frustration produced by absence of reward, primary drive remaining; (2) generalization decrement due to shifting from one inter-trial interval during acquisition to another during extinction. The two experiments performed tested: (1) the generality of Sheffield's finding; (2) inferences based on the frustration-generalization analysis of massed vs. spaced extinction; (3) massed and spaced extinction under non-frustrating conditions; *i.e.*, extinction with primary drive rather than reward absent.

**SUBJECTS:** Male albino rats, 40 in Experiment I, 64 in Experiment II.

**PROCEDURE:** Extinction of a food-reinforced position habit in a T-maze was studied, half the rats being extinguished with 15 seconds, half with 15 minutes between trials. Generalization decrement was controlled by training half of each extinction group with massed and half with spaced trials. In Experiment I, no food was present in the goal box during extinction; in Experiment II, food was present, but rats were satiated.

**RESULTS AND CONCLUSIONS:** In Experiment I, running times showed faster extinction with spaced than with massed trials, corroborating Sheffield's finding. Just the reverse held with "correct" runs. Both differences are statistically significant and in the direction expected from frustration alone. For running times, the difference following massed acquisition was larger than that following spaced acquisition; for correct runs, the reverse held. These differences support a frustration-generalization interpretation. In Experiment II, no differences were found except those following from generalization decrement. This result poses a problem for several theories of extinction. (Slides)

2:10 PM Resistance to experimental extinction as a function of distance of extinction point from original reinforcement point. WILLIAM W. LAMBERT and RICHARD L. SOLOMON, *Harvard University*.

**PROBLEM:** If a "goal gradient" is operative in the runway behavior of rats, one would predict that the more of the original reinforced sequence that is retained during extinction, the greater the resistance to extinction. Expectancy theory appears to be ambiguous with reference to this question. The present experiment is focussed at testing this prediction.

**SUBJECTS USED:** 20 albino rats, ages approximately 180 days.

**PROCEDURE:** Acquisition training was 9 days of reinforced trials, totaling 30 reinforcements, on a 97-inch elevated, partly covered runway. The runway was so constructed that the rats jumped from start-box to first runway segment, to each of three additional runway segments, and then onto a platform outside the goal box, then enter and eat for 30 seconds. The rats nosed through swinging doors at the beginning of each of the four runway segments and at the goal box. After the fourth trial each night, subjects were fed to satiety. **Extinction:** Subjects were divided into four groups, equated on latency. One group was extinguished by being blocked at the door outside the goal box, and three groups were blocked at the doors outside of the three different runway segments. Measures included: (1) trials to

a criterion of 120 seconds latency; (2) trials until the rat did not run all the way to the extinction point; (3) a measure of general activity in the free space at the block-point.

**RESULTS AND CONCLUSIONS:** All three measures indicate an increasing function as the extinction point approaches the original goal point. Additional evidence suggests that resistance to extinction is greatest if the rats are extinguished in the goal box. The general activity measure suggests a function of such activity in delaying extinction by holding off the reinforcement of resting responses. The prediction from goal gradient theory is upheld. (Slides)

2:25 PM Intermittent reinforcement. B. F. SKINNER, *Harvard University*.

The behavior of pigeons under the following schedules of intermittent reinforcement will be reported graphically: regular periodic, aperiodic, fixed ratio, variable ratio, and a combined case. Extinction curves following each schedule will be described. The factors operating in each schedule have been explored with special techniques including: interpolation of periods of "time out," reinforcement of responses only when they have not been preceded by other responses for  $x$  seconds, reinforcement of responses only when they have been preceded by  $y$  responses in  $x$  seconds. A generalized account is attempted in terms of (1) the overall rate of reinforcement, (2) a discrimination based upon the preceding reinforcement, (3) a discrimination based upon the total amount of responding since the preceding reinforcement and (4) a discrimination based upon the rate of responding immediately before reinforcement. (Slides)

### VISION I

1:40-2:40 PM, Tuesday, Osmond 117

JOHN T. METCALF, Chairman

1:40 PM Spatial interaction in peripheral vision.

ARTHUR J. RIOPELLE, *Emory University*.

**PROBLEM:** To investigate the effects of increasing dispersions of stimulus sub-areas upon the scotopic visual threshold.

**SUBJECTS:** Six randomly selected college sophomores in each of three experiments.

**PROCEDURE:** Each S was seated in a light-tight cubicle with his right eye 34 inches from a six-inch diameter circular stimulus window (angular subtense,  $10^\circ$ ). Light from the test patch fell on the temporal retina  $20^\circ$  from the fovea. Perforated masks were placed in front of the stimulus window. In experiment I the masks contained 64 one-eighth inch diameter holes. In experiment II the masks contained 16 one-

fourth inch diameter holes, whereas in experiment III there were four sub-areas, each one-half inch in diameter. In experiments I and II the sub-areas were uniformly distributed within circles of  $1\frac{1}{2}$ , 2, 3, 4, 5 and 6 inches diameter. In experiment III the four sub-areas were placed just inside these limiting diameters. The control mask used in all experiments had a single hole one inch in diameter. Total area was constant throughout.

Within each experimental series the various degrees of dispersion were presented in different sequences according to the latin square principle.

**RESULTS:** Significant differences among the dispersions and among individuals were obtained in all experiments. The data show that the more widely the sub-areas are separated the more the threshold rises. The extent of the threshold rise is a function of the size of the sub-areas. The threshold intensity of the most widely separated small spots was 8 times as great as that for the one inch solid spot, whereas the threshold for the dispersed large spots was only one and one-half times as great as the control area.

These data support an hypothesis of interdependence of stimulated points.

This experiment was conducted at the University of Wisconsin. (Slides)

1:55 PM Relationship between photopic and scotopic visual acuity. IRVING A. WOODS and J. E. UHLANER, *Personnel Research Section, AGO, Department of the Army*.

**PROBLEM:** To determine relationship between photopic and scotopic visual acuity.

**SUBJECTS:** 202 enlisted men between the ages of 17 to 43 were tested.

**PROCEDURE:** These subjects were tested with the Army Night Vision Tester, ANVT-R2X, The Modified Landolt Ring, the Army Snellen, the Quadrant Variable Contrast Chart, the Dot Variable Contrast Chart, and the Bausch and Lomb Orthorater. A Derived Brightness Discrimination score based on selected photopic tests was also included. All subjects were tested with both eyes and wearing glasses if necessary to their everyday vision (15% of the subjects wore glasses). All subjects were dark adapted for 30 minutes and instructed in night seeing principles. The light under Scotopic conditions varied between 3.51 to 5.26 log micro-microlamberts. With regard to the Photopic tests, all subjects used the wall charts, 20 feet from the target, using a head rest and binocular vision. The distance of target for the scotopic test was also 20 ft.

**RESULTS:** The tables of the intercorrelations of the 11 variables are presented. The Photopic measures correlated with the Scotopic measures, and ranged from 0.19 to 0.39.

2:10 PM The instantaneous threshold and early dark adaptation in the fovea. HOWARD D. BAKER, *The Johns Hopkins University.*

**PROBLEM:** The "instantaneous threshold" has been defined (Blanchard) as the absolute threshold immediately after cessation of an adapting luminance. Such a definition is arbitrary, and represents only one point on a curve which describes the transition between a differential threshold and an absolute threshold. In the present paper is described the course of the change in threshold luminance of a one-degree diameter centrally fixated stimulus before, during, and after the extinction of a twenty-degree diameter adapting field.

**SUBJECTS:** Two subjects with normal vision.

**PROCEDURE:** To obtain precise time relations between the adapting field and the stimulus, an apparatus employing electronic timers and electronic light flash generating tubes was used. The psychophysical method was the ascending series of the method of limits. All measures were taken in the fovea.

**RESULTS:** Approximately 0.1 second before the adapting light is extinguished, the differential threshold rises briefly, by about 0.1 log unit, reaching its peak at the time of extinction of the adapting light. After the adapting light is extinguished, the threshold drops rapidly for three or four tenths of a second, then more slowly, in the familiar foveal dark adaptation curve. The initial drop is about one and one-half log units. The exact magnitude of the change depends upon the intensity of the adapting illumination.

It is apparent therefore that the size of the foveal instantaneous threshold depends upon the time at which it is taken. If it is taken within a few milliseconds of the cessation of the adapting light, it has a value which is very similar to, or slightly higher than, the differential threshold at that luminance. (Slides)

2:25 PM Vernier and stereoscopic acuities as influenced by rate of alternation of pseudoscopic and stereoscopic presentations of the test object.

WALTER J. RICHARDS, *Brown University.*

**PROBLEM:** To determine the effect on vernier and stereoscopic acuities of variations in rate of alternation of pseudoscopic and stereoscopic presentations of a test object.

**SUBJECTS:** Three male subjects with 20/20 vision.

**PROCEDURE:** A target of the Helmholtz three-needle type was used. In the stereoscopic-pseudoscopic condition, the right eye received a view of the target corresponding to its own position at the same time the left eye received a view corresponding to its position. The views then alternated, *i.e.*, the right eye received a view of the target from the position of the left eye and the left eye received one from the position of

the right eye. The result of this procedure was a sequence in which the variable element of the target appeared alternately before and behind the fixed elements.

The same procedure was employed in the vernier condition, except that both eyes received views from the same position simultaneously. Thus, both eyes received a view of the target from the position of the right eye, then from the position of the left eye. The result was an alternating lateral displacement of the variable element without the appearance of depth. The psychophysical method of constant stimuli was employed in both vernier and stereoscopic situations. **RESULTS:** Beyond about 2.5 cycles of alternation per second, stereoscopic vision becomes impossible. Vernier discrimination persists to nearly 15 cycles per second under the same experimental conditions. Stereoscopic thresholds have the usual relation to vernier thresholds at the low speeds, but are almost three times as high at the fastest speed. This may relate to the supposition that stereoscopic vision is dependent on higher neural centers. (Slides)

## TEMPORAL FACTORS IN LEARNING

2:50-4:05 PM, Tuesday, Osmond 119

JOHN F. DASHIELL, Chairman

2:50 PM Periodic reinforcement in the presence of a discriminative stimulus. JAMES A. DINSMOOR, *Columbia University.*

**PROBLEMS:** (1) Effect on response rate of periodic reinforcement in presence of the positive stimulus. (2) Use of difference in rates under positive and negative stimuli as measure of discrimination. (3) Effect of such training on resistance to extinction.

**SUBJECTS USED:** 28 male albino rats.

**PROCEDURE:** Groups A and B were presented with the positive stimulus (light or darkness) during the final minute of each three-minute cycle; the first bar-press after the end of this minute produced a pellet of food and terminated the stimulus. Group C was presented with the same stimulus at the end of the three minutes; a single response again produced reinforcement and terminated the stimulus (control). Each group received 125 reinforcements.

During four fifty-minute sessions of extinction, the positive and negative stimuli were alternated in periods of 2½ minutes each in groups A and C; in B, each response produced three seconds of the positive stimulus (secondary reinforcement).

**RESULTS:** In groups A and B the rate of responding during the first two minutes of the cycle (negative stimulus) declined throughout training and the rate during the final minute (positive stimulus) increased; a ratio of four to one was attained, with a chance

probability less than 0.001. The rate during the final minute was also significantly higher ( $< 0.001$ ) than that for group C. Latencies, however, soon declined to an asymptote, and no group difference was manifested.

During extinction, the difference in responding under the positive and negative stimuli was significantly greater ( $< 0.001$ ) for A than for C, indicating the superiority of the periodic procedure. Total responding in B, however, did not differ significantly from that in either A or C and could not be evaluated.

**3:05 PM** Warm-up effect as a function of level of practice in verbal learning. LELAND E. THUNE, *Vanderbilt University*.

**PROBLEM:** To study the warm-up effect in verbal learning with particular reference to the effects of increasing amounts of practice.

**SUBJECTS:** Sixty undergraduate male and female college students.

**PROCEDURE:** All subjects served under the same experimental condition. Subjects, working individually, learned 15 10-item lists of paired-associate adjectives. Three lists were learned to the criterion of one-perfect repetition on each of five days. The order in which the lists were presented was randomized between subjects.

**RESULTS:** The efficiency with which successive lists were learned was determined by two major variables: (1) the number of lists previously learned within that session, and (2) the number of prior learning sessions. Within each session there was a marked rise in learning efficiency as shown by performance on successive lists. Most of this rapid intra-session gain was lost during the interval (generally one day) which intervened between sessions, thus leaving the subject only slightly more proficient than he was at the *beginning* of the previous session, and very much less proficient than he was at the *end* of the preceding session. The warm-up gain which took place within each session was consistently larger than was the general practice effect obtained from all five sessions taken together. Thus, even the second list learned during the first session was mastered more rapidly than was the first list in the fifth session. When the data were analyzed by an analysis of variance, the resulting F-tests were highly significant for both "within sessions" and "between sessions" gains. Amount of intra-session warm-up gain was found to be relatively independent of general level of practice as measured by the number of prior sessions. (Slides)

**3:20 PM** 'Spontaneous alternation' as a function of time between trials and amount of work. KAY C. MONTGOMERY, *Harvard University*.

**PROBLEM:** To investigate the simultaneous effects of inter-trial interval and work upon 'spontaneous alternation.'

**SUBJECTS:** Forty-five male albino rats 60 days of age. **APPARATUS:** A simple Y-maze containing a food tray and a lever, which could be counter-weighted as desired, at the end of each arm.

**PROCEDURE:** Five subjects were assigned at random to each of the nine experimental conditions obtained when three values of inter-trial interval (20, 45 and 90 sec.) and three of work (15, 40 and 90 gm. of lever-weight) are cast into a simple factorial design. After preliminary training during which each S learned to depress a lever counter-weighted with as much as 95 gm., all animals were given 100 acquisition and 40 extinction trials in the Y-maze. Experimental conditions were held constant for each group throughout all trials; both levers were counter-weighted with the same amount for any one group; all responses were reinforced during acquisition, none during extinction; and the sequence of R and L choices made by each S was recorded.

**RESULTS:** During acquisition, per cent alternation is: (1) a decreasing function of inter-trial interval; (2) *not* related to work; (3) an increasing function of number of trials for the 20-sec. group but a decreasing function for the 45- and 90-sec. groups. During extinction, per cent alternation is: (1) a decreasing function of inter-trial interval; (2) *not* related to work; and (3) an increasing then a decreasing function of number of non-reinforced trials for all groups.

**CONCLUSIONS:** (1) Alternation decreases with length of inter-trial interval. (2) Alternation bears no relation to amount of work. The relevance of these results to Hull's concept of 'reactive inhibition' is discussed. An explanation of alternation, based upon 'exploratory tendencies,' is suggested.

**3:35 PM** The effect of change to different kind of practice following rest in rotary pursuit learning. CARL P. DUNCAN, *Northwestern University*.

**PROBLEM:** To study the course of reminiscence in rotary pursuit learning when the degree of massing of practice is changed from pre-rest to post-rest trials.

**SUBJECTS:** Four groups of undergraduate women, totaling 157.

**PROCEDURE:** Four groups of Ss were given 10 trials of practice on a pursuit rotor, then were given 10 minutes rest, then 10 more trials of practice. In the pre-rest trials two groups used distributed (10 seconds practice, 20 seconds rest) practice; the other two groups used massed (continuous) practice. Following the 10 minute rest, one of the distributed practice groups changed to continuous practice, and

one of the massed practice groups changed to distributed, for all of the post-rest trials. The other two groups practiced the same way after rest as they had before.

**RESULTS:** Massed practice has a greater detrimental effect on performance late in practice than it does earlier in practice. Reminiscence is somewhat affected by the Ss' knowledge of the degree of massing of practice to which they will be subject after rest. The theory of reactive inhibition is criticized since its postulated redevelopment after rest does not account for the observed difference between two groups practicing under massed conditions after rest, when those two groups have been subjected to differential pre-rest practice conditions. Finally, reminiscence appears under conditions of relative distribution of practice, pointing to the need for a definition of distributed practice. (Slides)

**3:50 PM** An experimental test of two explanations of the relation between response strength and stimulus intensity. CHARLES C. PERKINS, JR., *Kent State University*.

**PROBLEM:** The study was designed to determine if the increase in response strength with an increase in the intensity of the conditioned stimulus can be better explained (1) by an increase in general excitatory level (*i.e.*, neural facilitation), or (2) by treating conditioning as a special case of discrimination learning in which the positive stimulus consists of the experimental conditions plus "the C.S.," and the negative stimulus is the experimental conditions without "the C.S." According to this hypothesis, the relation between stimulus intensity and response strength results from the interaction of the positive (excitatory) gradient of generalization from the C.S. used during training and the "inhibitory" gradient extending from a negative stimulus of zero intensity.

**SUBJECTS:** Twelve male albino rats from three to five months old.

**PROCEDURE:** All subjects were trained in a hurdle-box to make a conditioned jumping response to a change in the intensity of a 2,000-cycle tone. Avoidance training was used. There was a five-second interval between the onset of the C.S. and of the U.S. (a 1,600 volt 0.002 ampere electric shock). Training was continued until S had made a total of 40 conditioned (anticipatory) responses. Half of the animals were trained to an increase in the intensity of the tone from 48 to 69 db., half to a decrease from 90 to 69 db. Upon completion of training, twenty test trials were run. For each subject, one-half of the trials were to the C.S., the other half to twice as great a change in the intensity of the tone (measured in decibels).

**RESULTS AND CONCLUSIONS:** For both groups the latency of response was shorter with the greater change in intensity. No evidence was obtained indicating that the physical intensity as such had any effect on response strength (latency). It is concluded that the results favor a discrimination learning interpretation of the relation between stimulus intensity and response strength.

## ROUND TABLE: EFFECTS OF BRAIN INJURY IN ANIMALS AND MEN: DOES THE EVIDENCE FIT TOGETHER?

*2:50-5:00 PM, Tuesday, Osmond 117*

**Moderator:** D. O. Hebb. **Participants:** Harry F. Harlow, Hans-Lukas Teuber, Joseph Zubin, Karl Pribram, and others.

## DISCRIMINATION LEARNING—I

*8:50-9:50 AM, Wednesday, Osmond 119*

A. S. EDWARDS, Chairman

**8:50 AM** VTE and efficiency of discrimination learning involving shock for correct choice. GEORGE J. WISCHNER, *University of Illinois*.

**PROBLEM:** To investigate the relationship between VTE and discrimination learning in a non-correction situation for shock-right, shock-wrong and no-shock groups of white rats.

**SUBJECTS:** Three groups of 10 rats each.

**PROCEDURE:** Description of discrimination learning procedure is provided in *J. exp. Psychol.*, 1947, 37, 271-284. The present paper is concerned with VTE behavior, a record of which was kept for each trial. These analyses were made: (1) frequency of VTE trials, (2) proportion of VTE trials representing correct responses, (3) relation between occurrence of VTE and the stimulus cue the animal was facing initially upon entering the reaction compartment.

**RESULTS:** The shock-right animals, the least efficient learners, showed the greatest number of VTE trials. For the total learning period, the number of VTE trials and the percent of these which were correct for each group were: shock-right—577 (41%); shock-wrong—229 (85%); no-shock—185 (89%). Similar analysis for the first 100 trials yielded the following: shock-right—351 (28%); shock-wrong—207 (84%); no-shock—67 (73%). For the shock-wrong and no-shock groups the greater number of VTE trials occurred when the animals happened to approach first the negative stimulus associated either with shock or hunger frustration. For the shock-right animals the greater number of VTE trials occurred when the animal initially faced the positive stimulus, that associated with shock.

**CONCLUSIONS:** Discussion will attempt to show that these results are not necessarily incompatible with the view that VTE is correlated with learning efficiency and that they appear to support the hypothesis that VTE may be a vestigial withdrawal response, anticipatory avoidance of a 'non-preferred' stimulus. (Slides)

9:05 AM The effect of continuous stimulus reversal on learning in the rat. FRANK GATLING, *Newcomb College, Tulane University.*

**PROBLEM:** To determine whether negative transfer effect is eliminated in a series of stimulus reversal problems, and whether rats show any evidence of "learning to learn."

**SUBJECTS:** Ten male albino rats.

**PROCEDURE:** Rats learned to choose a light gray stimulus over a dark gray stimulus on a converted Lashley Jumping Box. When the rats reached the criterion of 18 correct choices out of 20, the dark gray was made the positive stimulus. They were run to the same criterion then the light gray became positive again, and so forth. The rats were run through 13 reversals over a period of nine months.

**RESULTS OR CONCLUSIONS:** The mean scores in terms of errors necessary for the rats to reach the criterion are as follows: 51.8, 117.3, 128.4, 79.2, 79.1, 59.9, 66.1, 59.5, 57.9, 46.1, 47.7, 45, 43, 40.6. The conclusions are that the negative transfer effect is dissipated and that the rats give evidence of learning to learn.

9:20 AM The effects of differential rewards on discrimination reversal learning by monkeys. DONALD R. MEYER, *University of Wisconsin.*

**PROBLEM:** To investigate changes in reversed discrimination learning brought about by differentially rewarding the antagonistic responses.

**SUBJECTS:** Eight rhesus monkeys trained in reversal learning to the limit of interproblem change.

**PROCEDURE:** The animals were trained on a series of problems, each of which employed a different pair of stimulus-objects and involved acquisition of four reversed discriminations. Two levels of reward, shown to be differentially effective in another experiment, were offered for correct responses. Reversals were accompanied either by reduction of amount of reward, augmentation of amount of reward, maintenance of a small reward, or maintenance of a large reward.

The difficulty of a reversed discrimination provides an index of the relative strengths of competing tendencies, and interproblem performance curves provide a test of Hull's theory of incentive motivation. Two of the proposed determinants of reaction potential, delay in reinforcement and stimulus intensity, are

controlled statistically. Earlier practice with reversal problems eliminates habit strength as a source of interproblem changes. Rapid changes in the reinforced response minimize the effects of change in drive.

The fifth determinant, weight of food given as reinforcement, is independently manipulated. Since all determinants of reaction potential are immediately specified, Hull theory predicts flat interproblem trends for the four conditions of reward.

**RESULTS:** This prediction was not supported. It was found that the rewards were not differentially effective at the beginning of the problem series, and that changes in facilitative properties took place in a situation which precludes the formation of differential associations of amount of reward and amount of drive reduction.

**CONCLUSIONS:** A major determinant of the effectiveness of a given reward is the range of rewards presented, and postulations of simple relationships between weight of food and performance are necessarily in error. (Slides)

9:35 AM The generalization of inhibition to stimuli varying in the visual size dimension. MERRELL E. THOMPSON, *New Mexico State College.*

**PROBLEM:** This investigation was designed to study the form of the gradient of inhibition of an instrumental response to stimuli varying in the visual size dimension.

**SUBJECTS:** Twenty-seven male albino rats.

**PROCEDURE:** All subjects were trained under conditions of distributed practice to obtain food by opening doors in the centers of four white circles of the following areas: 20, 32, 50 and 79 square centimeters, until equal habit strength (as measured by latencies) had been established for all circles. Response to the 20 square centimeter circle was then extinguished in a sub-group of 16 subjects. Each subject in this group was then given one test trial per day on each of the four circles at intervals of thirty minutes for a period of three days. Similar procedure was followed with another sub-group of 11 subjects in which the response to the 79 square centimeter circle had been extinguished.

**RESULTS:** Generalization gradients of inhibitory potential were obtained for stimuli both larger and smaller than the stimuli used during the extinction trials. Both gradients showed a significant increase in response strength as a function of increasing difference in stimulus size. The shape of both gradients approximates a negative growth function. An analysis comparing the log latencies of the test trials with the criterion trials of the training series showed a significant generalization of extinction effects.

The present data confirm Hull's assumption that extinction effects generalize and tend to support his contention as to the shape of the gradient of generalization of inhibitory potential.

Jean Thompson and Mary Will Davis collaborated in this investigation. (Slides)

### PHYSIOLOGICAL PSYCHOLOGY—I

8:50-9:50 AM, Wednesday, Osmond 117

LEONARD CARMICHAEL, Chairman

8:50 AM The relation between electroencephalographic latency time of blocking of the alpha rhythm and reaction time to light. JOHN S. STAMM, *Union College*.

PROBLEM: To study the relationship between muscular reactions to light stimuli and latency time of blocking of the occipital alpha rhythm under several experimental conditions.

SUBJECTS: 20 normal human adults of high alpha index.

PROCEDURE: Occipital electroencephalograms were recorded under five experimental conditions. The subjects (1) were relaxing (passive); (2) responded to the light only (discrimination reaction); (3) responded to both light and sound stimuli; (4) responded when only light stimuli were presented; (5) responded when the light stimuli were presented at intervals of  $2\frac{1}{2}$  seconds (speed-b reaction). Reaction and latency times were measured simultaneously.

RESULTS: The mean latency times for all subjects under passive conditions were 0.346 second and under reaction conditions 0.342 to 0.327 second. The mean reaction times for subjects decreased from 0.408 second under discrimination to 0.319 second under speed-b condition. Differences between mean reaction times were significant at the 1% confidence level, while those between mean latency times were not significant.

The means of correlation coefficients between latency and reaction times for 20 subjects were around +0.31, while correlations between the means of reaction and latency times were around +0.54.

Under every condition there were stimuli for which latency times were longer than reaction times; under the speed-b condition 40% of these negative difference times were significant at the 5% confidence level. Under speed-b condition 11 subjects had longer mean latency times than mean reaction times.

CONCLUSIONS: There are significant positive correlations between reaction and latency times. Experimental conditions will influence reaction times, but not latency times which are frequently longer than reaction times. Latency times are not influenced by pe-

ripheral conditions, but are indication of thalamic-cortical activity.

9:05 AM The effects of anti-cholinesterase agents upon animal behavior: The effect of subcutaneous injections of di-isopropyl fluorophosphate on the retention of a maze habit by the albino rat. CHARLES E. PLATT and DELOS D. WICKENS, *Ohio State University*.

PROBLEM: This study was designed to investigate the effects of subcutaneous injections of di-isopropyl fluorophosphate on the retention of a maze by rats following physiological recovery from the effects of the drug.

Di-isopropyl fluorophosphate is a powerful anti-cholinesterase agent. Small quantities of this drug have a pronounced effect on the functioning of the nervous system by destroying the enzyme cholinesterase. Since cholinesterase acts to break down acetylcholine, DFP permits the continued action of acetylcholine and thus persistent and multiple firing off of neural impulses. It is of interest to determine whether there are persistent effects of DFP which may affect behavior but which are not revealed by chemical analysis of brain tissue.

SUBJECTS: Forty male albino rats were used. All animals were pure strain and were approximately ninety days old at the beginning of the experiment.

PROCEDURE: Following training on a straightaway, all rats were trained on a 14 unit multiple-T maze. Two trials per day were given until the criterion of three out of four errorless trials was attained.

Upon reaching the criterion, part of the animals were injected subcutaneously with a dosage of 2.00 mg./kg. of DFP in a suitable vehicle. A control group was injected with similar quantities of the vehicle.

Ten weeks after injection, the rats were retrained on the maze. Two trials per day were given until the criterion of three out of four errorless trials was again attained.

RESULTS: Analysis of the data for the relearning series revealed a significant difference in variability between the two groups, but no significant difference between means as tested with chi-squared.

It was concluded that this experiment did not offer any clear data to indicate that retention of a previously learned maze habit was disturbed by the DFP dosage given, following physiological recovery. (Slides)

9:20 AM Behavioral changes produced by asphyxia at birth. R. FREDERICK BECKER, *Jefferson Medical College*.

PROBLEM: Asphyxia resulting in delayed breathing in the newborn has been suspected as a chief cause of

neurologic disorders and mental retardation in early childhood. Can this correlation be demonstrated in a controlled animal experiment?

**SUBJECTS:** Guinea pig fetuses at term: 90 controls delivered by Caesarian section; and their 103 littermates asphyxiated in utero.

**PROCEDURE:** The maternal abdomen was anesthetized with procaine. A control was delivered. The remaining fetuses in utero were asphyxiated by clamping off the uterine vessels. They were delivered totally apneic and atonic when the heart beat was not palpable. Resuscitation was accomplished by infiltrating the lungs with oxygen under light positive pressure. Behavioral and neurologic manifestations at recovery were observed. Eighteen litters were allowed to live at least two months when learning and retention was tested on a simple alternation type of maze. All litters were killed at definite time intervals, and the brains were prepared histologically to study the course of brain pathology.

**RESULTS:** During recovery, all the neurologic sequelae reported for children with histories of apnea at birth were seen in one or the other of these asphyxiated animals (To be reported in detail in paper).

Severe cyanosis of the "blue-baby" type did not always signal severe neural damage. Some animals with brief anoxic bouts suffered more than others asphyxiated longer.

The site, as well as degree of injury, varied. Common foci for neural damage were: projection nuclei of the thalamus; tegmental nuclei of brain-stem; frontal cortex; lumbo-sacral cord.

Experimental animals were: apathetic; less active; less frustrated under stress; decidedly inferior learners with limited retentive capacity; stereotyped in their responses, and perseverative in their errors.

Typical pathology consisted of: petechial hemorrhages; short-lived edema; localized chromatolysis of nerve cells in some, generalized cortical atrophy in others. (Slides)

9:35 AM Relations between brain and behavior in rats following exposure to anoxia. WILLIAM P. HURDER, *Louisiana State University*.

**PROBLEM:** To determine the effects of varying degrees of anoxic anoxia on rats' ability to learn and to relearn and to determine the effects of the same degrees of anoxia on the integrity of the rats' cerebral cortices when the brains are removed 100 days after anoxia.

**SUBJECTS:** Conclusions drawn are based on behavioral data from 170 male albino rats, and brain data from 34 male albino rats.

**PROCEDURE:** Male albino rats were subjected to zero, one-half hour, three hours, and six hours, exposure at 30,000 feet simulated altitude, then, following

anoxia, either trained or retrained on the Stone multiple T alley maze. Brains of 100 rats were removed 100 days after anoxia and subjected to a procedure designed to permit a quantitative estimate of the cellular density of certain areas of the cerebral cortex.

**RESULTS AND CONCLUSIONS:** The behavioral results are interpreted as indicating that there is an orderly decrease in learning and relearning ability with increasing exposure to anoxia. Increasing variability of the loss of learning, and relearning ability, with increasing anoxia, is emphasized. The brain studies are interpreted as indicating a decrease in cellular density with increasing anoxic exposure and it is emphasized that the brains (as examined here) do not show increasing variability in cellular loss with increasing anoxia. It is concluded that a most important observation is that of the discrepancy between variability of brain changes and behavior changes.

## PHYSIOLOGICAL PSYCHOLOGY—II

10:00-11:00 AM, Wednesday, Osmond 117

WALTER F. GREYER, Chairman

10:00 AM Effects of brain damage on rat intelligence. HERBERT C. LANSDELL, *McGill University*.

**PROBLEM:** The marked differences obtained in the study of intelligence after brain injury in the rat, and in human clinical studies, may be due to differences of organization in the brains of the two species, or may be partly methodological artifact. This study reexamines the effects of rat brain operation with rearing and testing conditions more nearly analogous to the human clinical situation.

**SUBJECTS:** 70 hooded male rats: 13 normals, 57 operates.

**PROCEDURE:** Three types of cortical lesions were made in rats 19 days old and in littermates at 75 days: bilateral anterior, bilateral posterior and large unilateral.

From 24 days of age until testing at 120 days the rats were handled frequently and reared in boxes providing a complex environment.

A modified Hebb-Williams test (*J. gen. Psychol.*, 1946) yielded a total error score for a rat in ten runs on each of 24 items.

**RESULTS:** No significant difference in error score was obtained between anterior lesion and normal groups. The posterior lesion group made significantly more errors than the unilateral, which differed similarly from the anterior group. The only difference found between early and late operations was an advantage for the early posterior group. Correlations exist between error score and lesion size within the unilat-

eral and posterior groups. Analyses of covariance indicate that only the anterior-unilateral difference could possibly be accounted for in terms of size of the lesions rather than loci of the lesions.

CONCLUSIONS: With more "normal" conditions of rearing and another method of evaluating rat intelligence, the early-late brain damage comparison is more similar to human results and locus of lesion is found to be of more importance, than in previous studies.

10:15 AM An exploratory study of some effects of electro-convulsive shock on a conditioned emotional response. JOSEPH V. BRADY and HOWARD F. HUNT, *The University of Chicago*.

This report describes three exploratory experiments on the effect of electro-convulsive shock (ECS) upon a conditioned "emotional" response. This response consisted of a reduction in rate or cessation in lever pressing in a Skinner-box upon presentation of the conditioned stimulus, a clicking noise, which, after it had been on for five minutes, had been reinforced by the unconditioned stimulus, a mild shock delivered through a grill.

In experiment No. 1, eight male albino rats were trained to press the lever and conditioned in this manner. Four received a series of seven daily convulsive shocks and four a control procedure. Meanwhile the lever pressing response was extinguished and no clicker was presented at any time. After three additional days of extinction, the lever response was reestablished. The next day the retention of the "emotional" response was tested. All control animals stopped pressing the lever during the clicker and defecated. All ECS animals continued to press the lever and did not defecate during the test run. ECS markedly diminished but did not obliterate the "emotional" response. Factors such as drive changes, interactions between effects of ECS and extinction, and the like which might account for these results will be discussed.

In experiment No. 2 with six male albino rats, the method was similar except that the response to the clicker was extinguished prior to ECS. ECS was not followed by recovery of the "emotional" response, but it was easily reestablished by reinforcement after ECS.

The results of experiment No. 3 in which eight male albino rats were shocked ("punished") for pressing the lever during the clicker indicate not only that ECS did not influence retention of this reaction to the clicker but also that the "emotional" response of experiment No. 1 should not be attributed to any accidental punishment of a lever response. (Slides)

10:30 AM A method for the investigation of basic somatic response mechanisms in psychoneurosis. ROBERT B. MALMO, CHARLES SHAGASS, and JOHN F. DAVIS, *Allan Memorial Institute of Psychiatry and McGill University*.

PROBLEM: The present paper is concerned with the development of a method which appears promising for experimental investigation of basic central processes involved in psychoneurosis.

SUBJECTS: 10 psychoneurotic patients with pathological anxiety and 10 normal controls matched for age and sex.

PROCEDURE: We employed a modification of R. C. Davis' method for studying motor effects of auditory stimuli. Electromyograms were recorded from the extensor muscles of the right forearm during auditory stimulation. There were 10 3-sec. stimuli of constant intensity, about 80 db. above threshold. Stimuli were spaced at intervals of 90 sec. The subjects were instructed not to respond to the stimulus. A state of moderate muscular tension was induced by having the subjects hold a rubber bulb.

RESULTS: (1) Onset of tonal stimulation at high intensity appeared to constitute an effective startle stimulus for all subjects, patients and controls. (2) The immediate startle reaction was approximately the same in patients and controls. (3) The differences between groups appeared after the 0.2 sec. period of reflex startle. At this time the amplitude of muscle action potentials in the controls returned to pre-existing levels, while the action potentials of the patients continued to increase in amplitude. This difference between patients and controls was statistically reliable.

CONCLUSIONS: In comparison with the normals, the motor effect of auditory stimulation followed a significantly different temporal course in the psychoneurotics. These results are discussed in relation to a theory of defective central regulatory mechanisms in psychoneurosis. (Slides)

10:45 AM Electromyographic study of stimulus traces as response determiners. R. C. DAVIS, *Indiana University*.

PROBLEM: Does the excitation produced by the first of a pair of tones (or antecedent to it) act as a determiner of an intensity discrimination response made after the second tone of the pair?

SUBJECTS: Sixty-four adults arranged in various experimental groups.

PROCEDURE: Integrated electromyograms were recorded from finger extensor muscles of both arms while S's were put through the usual procedure for demonstrating time error. In the experimental groups S's were instructed to press a key with one hand to signal the second tone stronger and with the other to

signal weaker (key designations being reversed for half the S's). The first tone of each pair was standard; the second was equal to or slightly less than the first. Comparisons of action potentials and judgments were made with inter-stimulus interval varied from  $\frac{1}{10}$ " to 5" and with the first stimulus duration of 1" and 2".

**RESULTS AND CONCLUSIONS:** 1. Action potentials of the two arm muscles show an excitation for the first stimulus of each pair, with a decay much like that inferred from judgments in the classical time-error studies.

2. The "time error" (proportion of weaker judgments) is not, however, directly related to the course of this excitation; it is shown instead to be a function of the *difference* in excitation between the two competing reaction systems. The greater the difference between the two arms at the crucial time, the greater the number of responses will be made by the leading arm, regardless of their meaning.

3. The excitation difference between the two arms is determined partly by the size and shape of their responses to the first stimulus of a pair, partly by their antecedent status. It is therefore possible to predict the proportion of judgments before either stimulus has been delivered. (Slides)

## DISCRIMINATION LEARNING—II

10:00-11:00 AM, Wednesday, Osmond 119

GREGORY RAZRAN, Chairman

10:00 AM Discrimination learning with paired and single stimulus presentation. EUGENIA NORRIS, *University of Rochester*.

**PROBLEM:** An investigation was made of the implications of a relational theory of discrimination learning. The hypothesis tested was that opportunity for comparison is a necessary condition for discrimination learning and that the better the opportunity the more readily the problem will be learned. A further hypothesis tested was that in a more difficult discrimination, comparison is even more necessary than in an easier discrimination.

**SUBJECTS AND PROCEDURE:** Three groups of twenty male albino rats each were run. Group I was run on a white positive versus a black negative problem; Group II a black positive versus a white negative, and Group III a dark gray positive versus a light gray negative problem. In each of these three groups the animals were divided into two sub-groups of ten animals each. For one group the stimuli were presented simultaneously and for the other the stimuli were presented singly.

**RESULTS AND CONCLUSIONS:** In Groups II and III the animals that were run in the single stimulus presenta-

tion condition learned the problem with significantly fewer errors than did those in the simultaneous presentation condition. For Groups I and III the single presentation groups learned the problem with significantly fewer trials than did the simultaneous group. The advantage of the single stimulus presentation group for Group III was significantly larger than that for Group II. The results were interpreted as refuting the implications of a relational theory of learning that the solution of discrimination problems necessarily depends on the opportunity for stimulus comparison and is a function of the degree to which conditions favor such comparison.

10:15 AM Do simultaneous stimulus differences in the pre-training period aid discrimination learning? WILLIAM B. COATE, *Triple Cities College, Syracuse University*.

**PROBLEM:** Is no greater excitatory strength developed to a positive stimulus when that stimulus is paired with another on the same dimension than when presented alone in the pre-training period?

**SUBJECTS:** Twenty-eight naive, mature Wistar rats. **PROCEDURE:** All animals were taught to discriminate solid black upright from similar inverted triangles occupying about  $\frac{1}{2}$  of identical grey cards on a black Lashley jumping stand. Four matched groups: A1, A2, B1 & B2, were formed, based on number of trials to learn to a 20 correct out of 20 criterion. Each S received twenty overlearning trials.

The animals of the A groups each received sixty more trials under these conditions: (1) Positive triangle on dark grey, negative triangle on light grey, on 80% of these trials, and (2) this relationship reversed on 20%.

The B groups received identical treatment, except that on any one trial both cards were of the same brightness. The frequencies of the form-brightness relationships reinforced were the same as for the A groups.

Finally, groups A1 and B1 were trained in discriminating the two brightnesses, the more frequently reinforced brightness positive. Groups A2 and B2 were also given this training but with the more frequently reinforced brightness now negative. Both cards contained the positive form in this stage. Training continued to one errorless day. Ten trials per day were used throughout.

**CONCLUSIONS:** The mean difference in errors, and trials, to learn the brightness discrimination was larger for the two A groups than for the B groups. This difference in the differences suggests answering the problem question in the negative.

Further analysis of the data suggests testable hypotheses to account for the obtained differences.

10:30 AM The acquired distinctiveness of cues: the role of discriminative verbal responses in the acquisition of discriminative motor responses.

IRMA L. ROSSMAN and ALBERT E. GOSS, *University of Massachusetts*. (Sponsor, A. E. Goss)

PROBLEM: To test hypotheses, derived from Miller's S-R analysis of displacement, that (1) discriminative verbal responses to similar stimuli facilitate the acquisition of discriminative "motor" responses to the same similar stimuli and (2) inhibition of discriminative verbal responses to similar stimuli retards the acquisition of discriminative motor responses to the same similar stimuli.

POPULATION: 75 undergraduate students divided into five groups of 15 Ss.

PROCEDURE: Gibson's standard and first-degree figures were paired with nonsense syllable responses to construct lists of paired associates.

The two groups of the preliminary phase were treated as follows:

Experimental: learn paired associates to criterion; shock responses for one trial; immediate retention test.

Control: learn paired associates; one additional trial; retention test.

The three groups of the second phase were treated as follows:

Experimental I: learn paired associates to criterion; 20 trials to learn discriminative motor response to the figure stimuli of the paired associate problem.

Experimental II: learn paired associates; shock trial; learn motor discrimination.

Control: minimum experience with paired associates; learn motor discrimination.

RESULTS: The control group of the preliminary phase retained significantly more than the experimental group.

In the second phase significant or near significant differences were obtained for the following comparisons: Experimental I (124.08 correct responses) vs. Experimental II (112.32), Experimental II vs. Control (101.08) and Experimental I vs. Control.

CONCLUSIONS: The results of the preliminary phase indicate that shock will lead to a decrement in the strength of well-learned verbal responses. Miller's hypotheses are supported by the results of the second phase. (Slides)

10:45 AM The effect of preliminary extinction on the learning of a visual discrimination habit.

G. ROBERT GRICE, *University of Illinois*.

PROBLEM: Lashley and Wade have reported an experiment with the jumping stand apparatus in which the response of one group of rats to a 5 cm. circle was first extinguished. For a second group, the response to an 8 cm. circle was extinguished. Both

groups were then trained in a discrimination problem with the 5 cm. circle positive and the 8 cm. circle negative. In this problem there was an insignificant difference in favor of the group with initial extinction to the now positive 5 cm. circle. Since this result was in apparent disagreement with the predictions of stimulus-response theory and inconsistent with other data, it was desired to repeat the experiment in a simplified experimental situation.

SUBJECTS: Twenty albino rats.

PROCEDURE: Two groups of 10 white rats were trained to make a simple instrumental response to a black square as opposed to a white circle. For one group the negative stimulus was an 8 cm. circle and for the other it was a 5 cm. circle. Both groups were then trained in a size discrimination problem in which a 5 cm. circle was positive and an 8 cm. circle was negative.

RESULTS AND CONCLUSIONS: The group with preliminary training in which the 8 cm. stimulus was negative learned the size problem at a significantly faster rate than the group with preliminary training in which the 5 cm. stimulus was negative. The experiment is interpreted as being in accord with the existence of decreasing gradients of the generalization of extinction. The data are also interpreted as being in accord with the continuity theory of discrimination learning, and with the view that discrimination learning consists of the establishment of reaction tendencies to specific stimuli rather than to relationships between them. (Slides)

### DISCRIMINATION LEARNING—III

11:10 AM—12:10 PM, Wednesday, Osmond 119

DELOS D. WICKENS, Chairman

11:10 AM Effects of distribution of practice on simple visual discrimination. ROBERT B. AMMONS and CAROL H. AMMONS, *University of Louisville*.

PROBLEM: To investigate the effects of varied distributions of practice on a task calling for repetitive visual judgment of similarities of pattern.

SUBJECTS: 252 college students.

PROCEDURE: 20 pages of 30 square patterns each were prepared. Each square was divided into four smaller squares. Each small square was divided into two parts by a diagonal, and one part was shaded in. The pattern had either two corresponding shaded segments or no corresponding segments. S indicated as rapidly as possible which two segments were the same, or that none were. Score was number of correct discriminations per trial. Ss practiced for 20 trials of 40 sec. Trials were separated by 0-, 10-, 30-, or 60-sec. rests, and two periods of 10 trials were

separated by 1-min., 5-min., or 48-hr. rests. The 12 conditions represented every possible combination of the four inter-trial rest durations with the three inter-period rest durations.

**RESULTS:** Mean performance increased from 3.6 to 11.6 correct discriminations per trial. The greater the inter-trial rest allowed, the better the performance, although there was little difference between Ss with no rests and those with 10-sec. rests. Greater reminiscence was found after the inter-period rest, the shorter the inter-trial rest. With inter-trial rest held constant, the 5-min. inter-period rest led to the greatest amount of reminiscence. A warm-up period appeared only in the curve of the 0-sec. inter-trial rest group.

**CONCLUSION:** The effects of distribution of practice on a visual discrimination were found to be similar in many respects to its effects on relatively homogeneous motor tasks.

11:25 AM The relative difficulty of sorting for the color, number, and form concepts in a Weigl-type card sorting problem. DAVID A. GRANT, *University of Wisconsin.*

**PROBLEM:** The problem was to investigate the relative difficulty of sorting for color, form, and number on a card sorting test when the number of symbols per card was made independent of configuration of the symbols.

**SUBJECTS:** 96 men and women college students.

**PROCEDURE:** The sorting test consisted of 64 response cards with one to four, red, green, yellow, or blue symbols printed on each. The symbols were triangles, stars, crosses, and circles. Each card could therefore be sorted for color, form, or number of symbols. A sorting tray, consisting of four double compartments with stimulus cards in the upper half of each compartment, was used. The stimulus cards were one red triangle, two green stars, three yellow crosses, and four blue circles. In the standard procedure S is handed the response cards and told to sort them into four groups under the stimulus cards. He is told whether each card is sorted "right" or "wrong." At the first stage color sorting is called "right" until S makes ten consecutive correct responses, then "form" sorting is called "right" with no cue other than the shift in "rights" and "wrongs." After ten consecutive correct responses at stage two, the shift is to number, and then through three more stages involving second trials on the same three concepts. In the present experiment 24 possible orders of concepts in the six stages were used so that transfer effects from stage to stage were equalized among the three concepts.

**RESULTS AND CONCLUSIONS:** In spite of the increased difficulty of the number sorting caused by elimina-

tion of configurational aspects, overall results revealed that fewer errors were made in sorting for number than for color. Form sorting was easiest. Number sorting was found to perseverate significantly more than color or form sorting which accounted for increased errors on color and form stages. The amount of perseveration of color and form sorting dropped sharply from earlier to later stages, but this was not the case for number sorting. The perseveration of number responses is hard to explain simply in terms of available theory.

Mrs. Joan Ferris Curran ran half the experiments and aided in the statistical analysis. (Slides)

11:40 AM The specificity of the fixated response in the rat. ROBERT S. FELDMAN, *University of Massachusetts.*

**PROBLEM:** The purpose of this study was to investigate the stimuli that govern abnormal fixations in the rat.

**SUBJECTS:** 18 hooded and albino rats.

**PROCEDURE:** A group of rats was placed in an insoluble problem situation using a modified Lashley jumping apparatus. The rats were then tested to ascertain which animals had behavior fixations. The fixated rats were then permitted to walk on alternate trials to the stimulus windows by way of run-ways extending to the windows from the jumping platform. Preliminary studies had shown that fixated rats had a tendency to fixate the walking response though not necessarily to the same fixated position or stimulus-window established under jumping conditions. In this study, therefore, manual guidance was used on some walking trials to prevent walking fixations. The rats alternated jumping and walking responses for 200 trials. Those rats which did not alter their jumping fixations were placed in another situation where the two modes of response (jumping and walking) were gradually made similar by shortening the run-ways.

**RESULTS AND CONCLUSIONS:** The results showed that the animals readily learned correct walking responses which existed side-by-side with the fixated jumping response without altering them, i.e., an animal would almost always *walk* to the correct window but during *jumping* trials the response was always unadaptive and stereotyped even though the solution was the same under both conditions. Shortening the run-ways further revealed that fixated rats practice abnormal fixations for many trials while practicing adaptive responses in the same problem situation when the form of execution is comparatively slightly different. The results suggest that fixated responses are not responses to a particular position or stimulus window, but rather are specific responses in specific situations since there is little transfer between fixated

jumping responses and adaptive walking responses in the same problem. (Slides)

11:55 AM Oddity learning set formation in monkeys under variable effort and pretraining conditions. ROGER T. DAVIS, *University of Wisconsin*.

PROBLEM: The effect of two general conditions on the learning of a series of oddity problems: (1) previous training on unsolvable problems with different probabilities of reward (subsequently called "expectancy training") and (2) variable conditions of effort.

SUBJECTS: Nine test-wise macaque monkeys.

PROCEDURE: The animals were first tested to determine their effort maxima. Seventy-five per cent, fifty per cent and twenty-five per cent of the greatest weight an animal pulled in were the three weight-effort conditions, and ninety per cent, fifty per cent and twenty-five per cent of the maximum forward reach were the reach-effort conditions. The animals were then matched into three groups on the basis of earlier discrimination scores. All groups were given 720 trials of "expectancy training" in a three stimulus, oddity type situation with no solution possible. Group I was rewarded 11 per cent, Group II on 33 per cent and Group III on 99 per cent of the trials. After "expectancy training," 150 true oddity-principle problems were given to each animal. All problems were run for 12 trials and six problems were given each day. Each problem was assigned a different effort condition during a day's run.

RESULTS: The most efficient performance was made by the group with 33 per-cent-reward "expectancy training." The 99 per-cent-reward group was intermediate and the 11 per-cent-reward group lowest. The shape of the curves of the three groups differed with the 11 per cent group, showing especially inefficient performance in the terminal period. Combined weight-effort conditions facilitated the performance of the 33 per cent "expectancy trained" group, but did not facilitate the performance of the other groups. (Slides)

### EYE MOVEMENTS

11:10 AM-12:10 PM, Wednesday, Osmond 117

J. C. R. LICKLIDER, Chairman

11:10 AM The following motions of the human eye.

JOHN M. STROUD and DONALD W. CONOVER, *Human Factors Division of the U. S. Navy, Electronics Laboratory, San Diego, California*.

PROBLEM: To measure and describe the following motions of the eye in tasks involving horizontal motion of a target as a periodic function of time.

PROCEDURE: Electronic means of generating horizontal motions of a target as periodic functions of time

were used. Eye motions were recorded with a modified Dodge eye movement camera.

RESULTS: Eye motions show a succession of saccadic movements of high speed at 4-6 per second. The trace between indicates corrections of steady following motion have also occurred. The corrections may be of position, position and velocity or position velocity and acceleration. The type and accuracy of corrections are functions of the individual, the stage of learning, and the target motion. (Slides)

11:25 AM Coordination of the eyes in maintaining fixation. LORRIN A. RIGGS and FLOYD RATLIFF, *Brown University*.

PROBLEM: It is well known that the two eyes are remarkably well coordinated in the grosser movements of scanning and pursuit as measured by the ophthalmograph. The present experiment was undertaken to determine the extent to which this coordination extends to the very fine movements associated with optimal fixation and maximal visual acuity.

PROCEDURE: The subject attempts a constant binocular fixation on a set of cross-hairs. Each eye is provided with a tightly fitting contact lens. A plane mirror on each lens serves to reflect a recording beam of light onto a moving strip of photosensitive paper. The resulting traces provide a sensitive index of the degree to which small movements of one eye are related to those of the other.

RESULTS: The fine movements of the two eyes are indeed related to one another in several respects. Among these are slow drifts in fixation and compensatory jerks of about 5 minutes in visual angle which appear to correct for these drifts. Occasional wavy movements one or two minutes in magnitude are also similar in the two traces. Some of these oppose one another, however, and evidently represent variations in fusion rather than fixation. The finest (less than one minute) and most rapid (30 to 70 per second) of the movements show little evidence of any coordination of one eye with the other.

This research was carried out under Project NR-140-359, Task Order II, Contract N7onr-358 between the ONR and Brown University.

11:40 AM The role of physiological nystagmus in visual acuity. FLOYD RATLIFF, *Brown University*. (Sponsor, Lorrin Riggs)

PROBLEM: The recent theories of acuity may be divided, in general, into two classes. There are those which assume that discrimination of the pattern of a test object depends upon simultaneous responses of adjacent receptors; and those which assume that this discrimination is made by the same receptors being exposed to various parts of the retinal image by virtue of the small involuntary eye movements (physio-

logical nystagmus). The present experiments are designed to test whether or not measurable aspects of the eye movements during steady fixation are related to visual acuity.

**SUBJECTS:** Three subjects with essentially normal vision were used.

**PROCEDURE:** The subject fixated monocularly upon a cross hair in a homogeneous field. For a period of 75 milliseconds this fixation field is momentarily replaced by a parallel bar acuity test object after which the fixation field is restored. The test object is presented randomly in horizontal and vertical positions, and it is the task of the subject to report upon the orientation of the parallel bars. At the time of exposure of the test object the horizontal eye movements are recorded on a moving film by means of an optical lever provided by a small first surface plane mirror mounted in a contact lens worn by the subject.

**RESULTS:** Involuntary "drifts" of the eye during presentation of the test objects are clearly detrimental to the visual acuity. The rapid tremor of the eye (30 to 70 cycles per second) is less obviously related to acuity.

This research was carried out under Project NR-140-359, Task Order II, Contract N7onr-358 between the ONR and Brown University.

11:55 AM Number, duration, and pattern of eye fixations in check reading instrument groups.

WALTER F. GREYER, *Aero Medical Laboratory, Wright-Patterson AFB, Dayton.*

**PROBLEM:** This experiment was part of a program to determine the most efficient design of instrument groups for speed and accuracy of check reading. Eye movements and speed and accuracy of check reading were studied in relation to dial diameter and position in the instrument group.

**PROCEDURE:** An ophthalmograph was used to record eye movements by the corneal reflection method during check reading of a panel of 16 instruments. By the use of both stationary and moving film exposures data were obtained on number, location (horizontal and vertical), duration, and sequence of fixations. Dials 1, 1½, and 2¼ inches in diameter were used with constant spacing between dials. Thus the overall panel area varied with dial diameter. Speed and accuracy of check reading were measured independently of the eye movement records.

**SUBJECTS:** Twenty-four men with normal vision served as subjects. Each subject was given 72 trials equally divided among the three dial sizes.

**RESULTS AND CONCLUSIONS:** Good corneal reflection records were obtained, which could be projected to locate the points of fixation on replicas of the panels. The data indicated (a) an average of 2.6 fixations for the panel of 1½ inch instruments; (b) slightly

more fixations on the 1 and 2¼ inch instruments; (c) an average fixation duration of 0.27 second; (d) a preponderance of fixations on the upper half of the panel; (e) a tendency to fixate first in the upper left quadrant; (f) a tendency for the first fixation to be longest, and (g) that deviating pointers could be detected without direct fixation.

W. J. White collaborated with the author in this experiment.

### COMPARATIVE PSYCHOLOGY

1:40-2:40 PM, Wednesday, Osmond 117

WILLIAM T. JAMES, Chairman

1:40 PM Genetic differences in social behavior of dogs. J. P. SCOTT, *Roscoe B. Jackson Memorial Laboratory.*

**PROBLEM:** To determine the nature and importance of genetic difference in social behavior.

**SUBJECTS:** Strain of Basenjis (5 litters, 28 animals); Cocker Spaniels (7 litters, 34 animals).

**PROCEDURE:** Litters of puppies raised in a uniform standard environment were subjected to standardized handling at 5, 7, 9, 11, 13 and 15 weeks of age, and all reactions noted by a handler and observer. Reactions of avoidance or defense were noted, and related reactions weighted on a scale of 3. The resulting scores were analyzed.

**RESULTS OR CONCLUSIONS:** No significant differences between the scores at 13 and 15 weeks were found in either group (coefficient of reliability for CS strain = 0.89). There was a tendency in the CS strain for scores to start low and remain on the same level (no significant differences between 5 and 13 week scores; 23 out of 34 animals showed no significant change in either direction between 5 and 9 weeks), while in the B strain there was a tendency for the score to start high and fall off rapidly toward the same level as that of the CS strain (mean score at 5 weeks 50.2, at 13 weeks 18.71; 19 out of 28 animals showed a significant lowering of the score between 5 and 9 weeks). The differences between the means and SD's of the two strains at 5 weeks were both more than 4 times the S.E., but the B distribution completely overlapped that of the CS strain.

It is concluded that the differences between the two strains are largely genetic, although what part is strictly hereditary must await the results of cross-fostering experiments; that there are important hereditary differences in the tendency toward "shyness" in these groups, though no general conclusions regarding the breeds represented should be made.

Important effects of differential training have been reported elsewhere. Comparisons with the human situation are discussed.

The data were collected with the assistance of Mary-Vesta Marston and Margaret Charles.

1:55 PM Inhibition of competitive fighting by stabilization of the primary reinforcing stimulus.  
 EMIL FREDERICSON, *Roscoe B. Jackson Memorial Laboratory.*

PROBLEM: An experimental study of competitive behavior in relationship to fixed and movable goal objects.

POPULATION: 36 homozygous mice of the strain C57 black, subline 10 (Jax), inbred by brother-sister matings for 33 generations. The group consisted of 20 males and 16 females, 2-5 months old.

PROCEDURE: The subjects, living together in same-sexed pairs, were trained to compete over food. Technique: After 24 hours of food-deprivation a single small piece of hard laboratory food was placed into the cage of a given pair of mice. After several trials a vigorous, intense fight was elicited in all pairs. Criterion of vigorous fight: mutual biting and wrestling over food. All subjects were then deprived of food for 48 hours. At this time trials in which food could be carried around freely were alternated with trials in which a single piece of food was fixed to an immovable ceiling support.

RESULTS: It was found, without exception in individual pairs, that competitive fighting occurred always during trials with a single movable food object. An instantaneous cessation of competitive fighting was observed during trials with a single but fixed and immovable piece of food.

CONCLUSIONS: The evidence suggests the notion that a fixed, immovable primary reinforcing stimulus is a major variable in the control of competition and the arousal of mutual tolerance in a need-reducing situation. The uniformity of the results can be attributed at least in part to the use of genetically controlled organisms. (Slides)

2:10 PM Rivalry and cooperation in white rats.  
 LOH SENG TSAI, *Tulane University.*

RIVALRY: The original experiment was performed at the University of Chicago in 1930 using twenty rats comparable in age and weight. After two months of preliminary feeding each rat was required to eat 2 cc. of wheat embryo either in isolation or in groups of two, three or four. The average feeding times were 204.3, 173.7, 168.7, and 169.8 seconds respectively.

The experiment was duplicated at Tulane in 1949 with Joseph Ward. Drinking of milk was substituted for eating. The amounts drunk in two minutes were 4.5, 5.8, 5.8, and 5.5 grams respectively.

COOPERATION: Tsai's cooperation apparatus was used. Original experiments were performed in Peiping in

1932, using 8 pairs of rats. The task was for the pair to press separate electric keys simultaneously in order to open the door leading to food. During training, the rats exhibited preferences for certain keys. When rats having the same preference for a particular key were teamed together, one immediately reordered his preference to successfully perform the task.

The experimenter then placed one rat in the reaction chamber and delayed his partner in the release box for 15 seconds. The number of attempts of key pressing by the released rat decreased from trial to trial. Some finally waited passively for the release of the partner to press the keys simultaneously.

In a recent experiment with George Passey at Tulane, an extra key was installed in the reaction chamber in front of the release box. Each released rat learned to press this key in order to release his partner so that both could go to the opposite side of the reaction chamber to press the two keys simultaneously.

Work is under way to make a moving picture study of cooperation between cats and rats.

2:25 PM A factorial study of emotionality in the dog. JOSEPH R. ROYCE, *Drake University.*

PROBLEM: The Division of Behavior Studies of the Roscoe B. Jackson Laboratory has been conducting a long range program on the relationship between genetics and social behavior in mammals (especially dogs). The dog project is being carried out in three basic stages: (1) test development; (2) factorial analyses of the basic data; (3) genetic analyses. Since the data gathering of the past four years has been primarily in the emotionality domain, a factorial study in this area is pertinent at this time.

SUBJECTS: The sample consists of fifty-three pedigreed dogs distributed as follows: 8 Basenjis, 6 Beagles, 12 Cocker Spaniels, 5 Scotch Terriers, 8 Shetland Sheep, and 14 Wire Hair Fox Terriers. There were 18 males and 35 females. These animals are the only ones of several hundred for which complete data were available as of May, 1949. The original stock from which Jackson Laboratory dogs descended is either registered in the American Kennel Club or is eligible for registration. The laboratory has pedigrees of all the original animals which includes a minimum of three generations.

PROCEDURE: The test scores on 32 physiological, psychological, and social measures were normalized and intercorrelated. The Pearson product-moment correlation matrix was factorized by Thurstone's complete centroid method. An oblique "simple structure" was obtained for the ten factors through the use of two dimensional radial rotations.

RESULTS: Nine of the ten psychophysiological factors were interpretable, and were identified as: Timidity

I, Heart Reactivity to Social Stimulation, Energy Expending, Excitability, Energy Conserving, Activity Level, Audiogenic Reactivity, Timidity II, and Dominance. The tenth factor was regarded as a residual. (Slides)

### SPACE PERCEPTION

1:40-2:40 PM, Wednesday, Osmond 119

C. P. HEINLEIN, Chairman

1:40 PM A factor analysis of depth perception test scores of male subjects having normal acuity. HOWARD C. OLSON, *University of North Carolina*.

PROBLEM: To determine by a factor analysis the most important dimensions of a group of far depth perception test scores when visual acuity of the subjects is normal.

SUBJECTS: Seventy male college students ranging in age from 19 to 33 years participated voluntarily as subjects for this study.

PROCEDURE: All subjects were examined initially using a visual screening instrument to select only those who had normal (20/20 Snellen equivalent or better) visual acuity. All subjects were administered eleven far depth perception tests on a test-retest basis. Tests and retests were approximately three weeks apart. Criterion data in the form of far and near acuity and vertical and lateral phorias, far and near, were collected for each subject at the time of the retest. These data, comprising twenty-six variables, are being factor analyzed using the Thurstone centroid method.

CONCLUSIONS: The extraction of factors is now in the process. Preliminary results indicate the presence of three principal factors: stereopsis, vertical phoria, and consistency of judgment as determined by the variability in a series of scores on the Howard-Dolman depth test.

1:55 PM The relation of perceived size to perceived distance. HOWARD E. GRUBER, *Cornell University*.

PROBLEM: To test the hypothesis that perceived size of objects is a function of retinal image size and of perceived distance. While judgments of *equal* distance are extremely accurate, the perception of the relative sizes of unequally distant objects must depend on the effect of *relative* distance. It was predicted that underestimation of the relative sizes of far objects would be coupled with underestimation of their relative distance.

SUBJECTS: Fifty university students.

PROCEDURE: S adjusted a variable-sized triangle, pre-

sented on a screen twice as far from him as a standard, until it appeared the same size as the standard.

Then S adjusted the position of the near triangle until it appeared to be one-half as far from him as the far triangle.

RESULTS: A mean objective distance ratio of 1.2:2 produced a subjective ratio of 1:2. This discrepancy did not vary systematically with absolute distance.

In judgments of equal size, the variable was set 5 per cent to 23 per cent larger than the near object, the error increasing with absolute distance.

Therefore, in a situation where the relative size of a far object was underestimated, its relative distance was overestimated, and these results contradict the hypothesis. Moreover, analysis revealed little or no correlation between an individual's estimates of size and his estimates of the distance ratio.

It is suggested that perceived size is a function of the proportion of the image size of an object to the image size of certain relevant parts of the framework in which the object is seen. Certain constant errors are predictable, since retinal image size is not a linear function of object size, except for small angles. Experimental results are offered in support.

2:10 PM Familiar size as a "cue" in the perception of "depth" in figures with reversible perspective. CAROL BARNES HOCHBERG (Sponsor, J. E. Hochberg) and JULIAN E. HOCHBERG, *Cornell University*.

PROBLEM: Where two figures of objectively different sizes and distances, *i.e.* a distant man and a near-by child, occupy equally large adjacent retinal areas, the man is not usually seen as a midget standing beside the child, but as a man at a greater distance. This perception of differential distance has been assumed to be due to knowledge, from past experience, of the true sizes involved. An analogous situation was designed in which all depth cues other than that of "familiar size" were controlled to determine whether appropriate depth judgments would still be made.

SUBJECTS: 90 psychology students.

PROCEDURE: Groups I-IV: A line-drawing of a two-paneled figure with reversible perspective was viewed monocularly through a reduction screen. Upon one panel was drawn a boy, on the other a man, of almost identical size and contour. The subjects recorded the relative time each panel was seen forward.

Groups V-VI: Subjects viewed the same reversible figure with a drawing of the boy on one panel, and a reduced drawing of the same boy on the other panel.

RESULTS: Groups I-IV showed no significant difference between the proportion of time the boy appeared forward, and that of the man.

Groups V-VI: The large boy was seen forward more than the small boy, significant at the 2% level. CONCLUSIONS: The factor of "familiar size" did not affect the perspective reversals in the figures used. Groups V-VI showed that reversals of the ambiguous figures *could* be affected by the "contents" of the panels, but here equality of size, not familiarity, is probably operative, as may be the case in most so-called demonstrations of familiar size as a depth cue. (Slides)

2:25 PM Critical flicker frequency in relation to performance in reading the dials of airplane instruments. ROBERT GLENN DEMAREE, *University of Illinois*. (Sponsor, Alexander Williams)

PROBLEM: To investigate (1) the changes, if any, in critical flicker frequency before and a few minutes following the reading of a series of airplane-instrument dials, and (2) the evidence, if any, for linear relationships between critical flicker frequency and the accuracy and speed with which the dials are read. SUBJECTS: 44 male college students.

PROCEDURE: The apparatus for measuring critical flicker frequency utilized a commercial stroboscope as the intermittent-light source. The flickering area subtended a visual angle of 0.6, and was viewed binocularly against dark surrounds. Following 3 min. of dark adaptation, 5 double determinations of critical flicker frequency were made using the method of limits. Critical flicker frequency was measured in this manner both before and a few minutes following the reading of the dials.

The dials were disclosed through a 5-inch square opening by a manually-operated, fast-action shutter. Each subject made 20 readings on each of four dials. Half of the subjects read the dials under simulated daytime conditions and half under nighttime conditions. The time required by the subject to give a verbal response to the setting on the dial was recorded to hundredths of a second. The range of settings on the dials was 1 to 49, with response errors recorded to the nearest whole number.

An analysis of variance was applied to the data to test hypotheses that accuracy and speed in reading dials are independent of critical flicker frequency, and of each other.

RESULTS: (1) No significant difference was found between critical flicker frequency scores obtained before and following the reading of the dials. (2) An inverse linear relationship, significant at the 1% level, was found between critical flicker frequency and median response error. (3) No evidence was found for a relationship between critical flicker frequency and median response time or between response error and response time. (Slides)

## CONDITIONING

2:50-3:50 PM, Wednesday, Osmond 119

R. C. DAVIS, Chairman

2:50 PM Avoidance conditioning in normal dogs and in dogs deprived of normal autonomic functioning. RICHARD L. SOLOMON and LYMAN C. WYNNE, *Harvard University*.

PROBLEM: Current theories of the acquisition and maintenance of avoidance responses usually employ the anxiety or pain-expectation concepts. One approach to the problem of the role of anxiety in avoidance conditioning would be the elimination of those autonomic responses whose presence or absence is often used to designate the presence or absence of anxiety. One would predict, taking this peripheral interpretation of anxiety seriously, that animals deprived of normal autonomic functioning would be incapable of demonstrating anxiety and therefore would not acquire conditioned avoidance responses anticipatory to noxious stimulation. Such animals should, however, be able to learn to escape from noxious stimulation.

SUBJECTS: Nineteen normal dogs, and seven dogs with deficient autonomic functioning, prepared by surgery and drugs.

PROCEDURE: All dogs were trained in a shock-avoidance shuttlebox situation (after Mowrer). The C.S. consisted of the compartment containing the dog being darkened and a gate between the two compartments being opened. The shock followed the C.S. ten seconds later. The instrumental act was jumping over the barrier that separated the two shuttlebox compartments. A criterion of ten avoidances in a row was used for learning. Then extinction was started.

RESULTS: The normal animals started avoiding on 100% of the trials after a mean of 14.9 trials. Extinction was never obtained, one dog being run for 650 trials. The typical acquisition curve was two-phased: an escape curve and an avoidance curve. All dogs deprived of normal autonomic functioning learned to avoid, but started avoiding after a mean of 35 trials. Six of these seven dogs extinguished in less than 200 trials.

CONCLUSIONS: The autonomic nervous system plays a part in avoidance conditioning, but is not absolutely necessary for it. The course of avoidance conditioning is altered by autonomic blockage. (Slides)

3:05 PM Temporal conditioning vs. anxiety reduction in avoidance learning. B. R. BUGELSKI and R. A. COYER, *University of Buffalo*.

PROBLEM: To determine role of temporal conditioning in an avoidance learning situation heretofore explained by anxiety and expectancy postulates.

**SUBJECTS:** Thirty albino rats in 3 groups of 10.

**PROCEDURE:** All three groups were trained to jump back and forth over a fence dividing an enclosed area into 2 sections. The grid floor in each section was charged separately. A buzzer was the C.S.; shock the Unc. S. Each subject had twenty-four trials per day for 10 days. For Group I a buzzer sounded every 60 seconds. If no jump was made in 5 seconds, the animals were shocked. Groups II and III received the same treatment with these additions: Group II rats were shocked at 15 second intervals in each 60" period. Group III rats were shocked every 15 seconds only if no jump occurred in the interval.

**RESULTS:** 1. Group III rats learned to jump to the buzzer better than the other groups which did not differ significantly. These findings are interpreted to mean that shocks at regular intervals resulted in a temporal conditioning which facilitated learning responses to the buzzer. Mowrer has admitted that failure to find a difference between Groups I and II justifies a temporal conditioning explanation of avoidance learning in a similar situation.

2. Animals in Groups II and III developed "spontaneous" jumping responses to a striking degree. Group III animals averaged 75 spontaneous jumps by the 10th day or almost exactly 1 per 15 seconds. Group I showed little spontaneous jumping. Because of the temporal precision and the course of the learning a temporal conditioning explanation is again supported.

3. The results support Hull's account of avoidance behavior (*Principles*) as antedating responses developing from escape reactions. Anxiety reduction and expectancy explanations need not be invoked for the responses studied. (Slides)

3:20 PM The effect of partial and delayed reinforcement on resistance to extinction. M. E. BITTERMAN, *University of Texas*, and JANET CRUM, *Cornell University*.

**PROBLEM:** The fact that partial (e.g. 50%) reinforcement often produces greater resistance to extinction than does 100% reinforcement can be explained in terms of Hullian theory by assuming that partial reinforcement training conditions the response to a stimulus pattern normally present only during extinction. This interpretation may be tested by substituting delayed reinforcement for non-reinforcement on 50% of the training trials. The delay group should extinguish no less rapidly than the 100% group, since the after-effects of reinforcement are present at the beginning of each trial for both groups.

**PROCEDURE:** The apparatus employed was a small wooden enclosure with a grid floor, for shock administration, and a door through which the animals could escape into an adjoining compartment. Three

groups of rats were employed and the procedure involved three main stages. (1) Six-second buzzer was paired with brief shock (escape door locked). For Group A (100%) termination of the buzzer was always followed immediately by brief shock. For Group B (partial) shock followed buzzer on only 50% of the trials. For Group C (delay) shock followed buzzer on all trials, on half the trials *immediately*, and on half the trials after a 30-second delay. For all groups an average of three minutes elapsed between trials. (2) All groups trained to escape shock through door. The buzzer was not sounded. The door was automatically unlocked when shock appeared and locked between trials. (3) Buzzer alone was presented and extinction of the escape response was studied in all groups. (The escape door was locked except during the six-second intervals when the buzzer was sounded.)

**RESULTS:** The results did not confirm the hypothesis. Both the partial and delayed reinforcement groups made significantly more responses than did the 100% group in Stage (3). An alternate interpretation of these findings will be offered.

3:35 PM Multiple conditioning? surrogate conditioning, and stimulus generalization. GREGORY RAZRAN, *Queens College*.

In previous studies the writer proposed a rating-categorizing theory of CR stimulus generalization. Further analysis indicates, however, the need of supplementing this "-O-" type of theory with one that is S-R in essence and is based upon two revealed CR characteristics, namely, *multiple conditioning* and *surrogate conditioning*. Multiple conditioning refers to equipotential co-conditioning of multiple aspects of a conditioned stimulus, while surrogate conditioning denotes the co-conditioning of *surrogates* of the stimulus; and according to either, *stimulus generalization is conceived as a transfer effect of co-conditioned common or identical elements*.

Evidence suggests that (a) generalization through categorizing is predominantly operative in conditioning to simple sensory stimulus, (b) generalization through multiple conditioning is most common in conditioning to complex stimuli and objects, (c) generalization through surrogate conditioning is mostly confined to conditioning to meaningful verbal stimuli, and that (d) any two or all three mechanisms may act in conjunction. Forming salivary CR's to unfamiliar Russian words while the subjects were learning the meanings of the words (English-Russian paired associates) and testing for CR generalization at varying degrees of learning; and comparing CR generalization to flashes of single lights, multiple lights, and the word LIGHT—were helpful in developing the theory.

Generalization through co-conditioning is implied in all Pavlovian compound conditioning and is made explicit by Hull as a special variety of stimulus generalization. But what is contended here is that co-conditioning and categorization may well account for all CR generalization and thus obviate assumptions of cortical (or vacuo-behavioral) inundations, and fit better empirical data; data that at best yield only very crude generalization gradient and at times cast doubt on the appropriateness of the term *gradient* altogether.

### COLOR VISION

2:50-3:50 PM, Wednesday, Osmond 117

DAVID P. BODER, Chairman

2:50 PM Statistical analysis of multivariate color mixture data. R. W. BURNHAM and R. H. MORRIS, *Color Control Department, Eastman Kodak Company.*

**PROBLEM:** To outline a statistical procedure for the treatment of experimental data which are recorded in more than one dimension for each observation.

**SUBJECTS USED:** Tri-dimensional comparative color mixture data from five color-normal human observers.

**PROCEDURE:** The experiment was designed to produce comparative data in three dimensions which could be subjected to statistical treatment by a Chi-square test used as a generalized analysis of variance. The simultaneous consideration of more than one variable proceeds as a direct generalization of the more typical univariate analysis. The generalization consists in replacing "sums of squares" with "sums of product matrices." These matrices are, in turn, tested against a residual matrix in analogy with the univariate case.

**CONCLUSIONS:** Tri-dimensional comparative color mixture data cannot be adequately treated by typical univariate statistics. Multivariate techniques include the effect of inter-dimensional correlations which are not taken into consideration in univariate statistical theory. (Slides)

3:05 PM Shifts in the hue invariant points in the spectrum as indices of chromatic adaptation. LEO M. HURVICH and DOROTHEA JAMESON, *Color Control Department, Eastman Kodak Company.*

**PROBLEM:** To determine whether shifts in the hue invariant points in the spectrum are reliable and sensitive indices of chromatic adaptation.

**SUBJECTS:** Four observers with normal color vision.

**PROCEDURE:** The experimental technique involves the Bezold-Brücke effect. The observer views a divided field, of homogeneous wave-length but of two different intensities. A short-focus telescope focussed on

the exit slit of a Farrand monochromator provides the visual field of homogeneous wave-length, and the fixed intensity difference between the two halves of the visual field is produced by a neutral density gelatine filter covering half of the exit slit of the monochromator. As the prism of the monochromator is rotated, the spectrum sweeps past the exit slit; when the wave-length is thus varied an invariant hue is easily recognized since the Bezold-Brücke hue shift between the light and dark field halves occurs in opposite senses on either side of such a hue. With this technique the wave-lengths of the three spectral hues which are invariant with intensity were first measured for a neutral or equilibrium state, and the precision and day-to-day consistency of these measurements determined for each observer. The locations of these invariant hues were then redetermined following controlled exposures to "near white" adapting stimuli of heterogeneous wave-length distributions.

**RESULTS:** The data indicate that the three spectral invariant hues for the neutrally adapted eye can be measured with a precision of 1-3 m $\mu$  and a day-to-day consistency of the same order of magnitude. The available data suggest that the sum of the displacements of the invariant points following exposure to various "near white" stimuli may be taken as an index of the extent of chromatic adaptation since they are consistent with the results of other psychophysical experiments involving the same stimuli. (Slides)

3:20 PM Color and the intensity-time relation.

RICHARD O. ROUSE, *Williams College.*

**PROBLEM:** To determine whether there is a difference in the functions relating intensity and time, or in critical duration, for threshold color responses at a cone level of adaptation.

**SUBJECTS:** Three color normal undergraduates, well trained in visual threshold determinations.

**PROCEDURE:** Measurements of the intensity necessary for monocular differential thresholds for red, green, and blue test lights were made at exposures of the test light ranging from 0.002 to 1.000 second. Central fixation was used, the test light appearing as a small dot brighter than the surrounding, white-lighted field. The adaptation brightness was just above the cone threshold so that no photochromatic interval was involved. Adaptation was controlled over forty degrees of the visual field, including the very center, since the interference filters used both reflected the adaptation light and transmitted the test light. The data consist of approximately one thousand threshold determinations. The method of limits was used.

**RESULTS AND CONCLUSIONS:** No differences appeared among the functional relationships of intensity and time that are not accounted for by the brightness dif-

ferences of the colored lights. The critical durations were also the same for all the colors. These results are interpreted to mean that theories of color vision must hypothesize neither separate neural structures nor differential latencies for the theoretical primaries, which are of a nature that would cause variation due to color in either of the measurements made in this experiment.

**3:35 PM** An evaluation of four psychophysical methods for determining the difference limen of chromaticity. HARRY G. SPERLING, *U.S.N. Submarine Base*.

**PROBLEM:** This experiment investigated the variation in magnitude, precision and reproducibility of the difference limen of chromaticity with different psychophysical methods and different surround brightnesses.

**POPULATION:** Four observers.

**PROCEDURE:** The difference limen in one dimension through a single chromaticity in the I.C.I. chromaticity plane was measured using four different psychophysical methods, four background brightnesses with four highly trained color normal observers. The psychophysical methods used were: (a) Method of Constants—judged same or different; (b) Method of Constants—judged with direction (more blue or not more blue, more yellow or not more yellow); (c) Method of Paired Comparisons; (d) Method of Adjustments (Average Error).

With a bipartite comparison field of  $2^\circ 4'$  maintained at a brightness of 3.3 foot Lamberts the surround of  $15^\circ$  was varied in four brightness steps: 10 fL, 6.8 fL, 3.3 fL and 0.17 fL.

The separate treatment of methods effects, illumination effects, inter-subject differences, primary interactions and test-retest variability was done with a latin square design and the analysis of variance.

**RESULTS:** (a) Differences in the magnitude of the D.L. over all methods were significant at the 1% level. (b) Inter-observer differences were significant at the 1% level. (c) There was no significant variation in the D.L. with variation of surround brightness. (d) No significant interactions were found. (e) Comparisons of test-retest variability were made between total within-subclass variance of each pair of methods resulting in the following order of decreasing variability: Paired Comparisons, Constants "same or different," Constants "with direction," Adjustments.

**CONCLUSIONS:** Method of Constants "with direction" and Method of Average Error show more reproducible as well as smaller measures for the Difference Limen of chromaticity than do Paired Comparisons and Constants "same or different." (Slides)

## BUSINESS MEETING AND PRESIDENTIAL ADDRESS

4:00-6:00 PM, Wednesday, Osmond 119

B. F. SKINNER, Co-president, presiding.

W. J. BROGDEN, Co-president. *Some Theoretical Considerations of Learning*.

Note that both Fellows and Associates of the Division are entitled to attend and to vote.

## MEMORY AND ADAPTATION

8:50-9:50 AM, Thursday, Osmond 117

HARRY HELSON, Chairman

8:50 AM Adaptation effects and the Aubert and Müller phenomena. GEORGE E. PASSEY, *Tulane University*.

**PROBLEM:** An investigation of the effects of postural and postural plus visual adaptation upon the Aubert and Müller Phenomena was carried forward in this research. Postural adaptation results when subjects are exposed to tilted positions in space in absence of a visual framework. Visual adaptation results when subjects regard tilted visual targets in absence of a visual frame of reference.

**SUBJECTS:** Eight male subjects were used.

**PROCEDURE:** Subjects were required to adjust a linear visual target from initially tilted positions of  $45^\circ$  in each upper lateral quadrant to a position subjectively accepted as vertical. Adjustments were made while the subjects' bodies were maintained in tilted positions of 0, 5, 10, 15, and 20 degrees in each upperlateral quadrant. Each subject gave 200 judgments distributed over 10 experimental sessions of 55 minutes duration. Every possible combination of body and target tilt was used. A subject gave 10 judgments for each of these combinations save that involving  $0^\circ$  body tilt for which 20 judgments were secured. Half of the judgments at each position were made immediately following positioning and half were made following adaptation. Four subjects were maintained in a tilted position for 30 seconds on adaptation trials to produce postural adaptation. The remaining four subjects were maintained in a tilted position for 30 seconds and in addition were allowed to regard the visual target tilted at  $45^\circ$  during this time. The latter group had visual as well as postural adaptation. The visual target was the only visual stimulation available to the subjects.

**RESULTS:** Increase in body tilt maintained during adjustment of a visual target is accompanied by (a) an increase in average error of adjustment and (b) shift in constant error in direction of either Aubert or Müller Phenomenon. Adaptation as produced in

this experiment did not affect adjustment of the visual target when compared with immediate readjustments. (Slides)

9:05 AM The effect of general and of specific labelling on judgmental scales. B. ROGER PHILIP, *Toronto, Canada.*

**PROBLEM:** Previous studies have shown that labelling enhances judgmental scale values; does this enhancement occur at all points of the scale and does it differ according as the labelling is general or specific? **SUBJECTS AND PROCEDURE:** Three equated groups, each of 66 college students, rated 150 lines of poetry for melody, the concept of which was purposely left unstructured. There were four experimental sessions; in the first three sessions, the lines were rated on a scale of from 1 to 10 under three experimental conditions—general labelling, specific labelling, and no labelling. The fourth session consisted of a rerating of half the unlabelled lines, randomly chosen. The experimental design involved a graeco-latin square arrangement of groups of Ss, material and labelling conditions.

**RESULTS AND CONCLUSIONS:** Intercorrelations of the mean ratings given by the groups average around 0.93. Not only are the test-retest reliabilities high, but about two-thirds of the reratings do not differ by more than one point from the original ratings. Thus the concept of melody, although unstructured in the experimental directions, is a fairly stable one for the individual, and yields measures of adequate reliability. An analysis of variance indicates that the groups of Ss and of material are well equated, and that the method of labelling is statistically significant. A specific label enhances the rating values in the centre of the scale, while a general label has little effect on the rating. High rating values tend to become progressively less with practice, and the reverse holds for the lowest values. Thus habituation causes, not a diminution of rating, but a regression to some intermediate value. This effect is discussed in terms of Helson's adaptation level. (Slides)

9:20 AM The method of comparison applied to the problem of memory change. NELSON G. HANAWALT, *New Jersey College for Women.*

**PROBLEM:** To check a study by Irwin and Seidenfeld published in 1937 with the above title. Irwin and Seidenfeld used a method of repeated comparison by the same subjects at different time intervals, thus repeating the error of Wulf in his study of memory trace by the reproduction method. The purpose of the present paper is to check the hypothesis that the trend found by I. and S. is an artifact of their method of repeated comparison with the original stimulus.

**SUBJECTS:** 447 college sophomores (female) from three different sophomore classes.

**PROCEDURE:** The comparison method of I. and S. is followed excepting that their error of having the same subjects make repeated comparisons with an original stimulus is corrected by having one subject make just one comparison. The same time intervals are used, but a new group of students is used for each time interval. A few other controls are introduced which were uncontrolled in the I. and S. study. **RESULTS:** The results are at variance with those of I. and S. No consistent trend in results with the passing of time is found. We find that there is little variation from chance expectation, excepting in one of the six figures—a figure not critical for the Gestalt theory of memory trace.

**CONCLUSIONS:** The consistent trend found in I. and S. can be explained on the basis of their erroneous method of repeated comparison.

9:35 AM The partial contributions of "satiation" and "adaptation" to figural after-effects in symmetrical and non-symmetrical situations. BERNARD H. FOX, *George Washington University.*

**PROBLEM:** During the course of checking the "distance paradox" of Köhler and Wallach, some results were obtained that contradicted the predictions of "satiation theory." It was suggested that Gibson's "adaptation to the norm" might also be effective under conditions of non-symmetry other than the linear situations that have so far been investigated.

The problem then became to find the amount of figural after-effect when a symmetrical situation was used, and compare this amount with the results already found.

**SUBJECTS:** Experiment I, 11 men, one woman, students and faculty at the University of Rochester. Experiment II, 4 men, 3 women, all students at Rochester except one woman.

**PROCEDURE:** Experiment I: Using the task of setting two dots (T figure) to the apparent horizontal, figural after-effects were measured to the nearest 0.1 mm. following 1½ minutes of exposure to two solid rectangles situated, respectively, one above and one below each dot. Ten trials were used for each S for every position of the rectangles, which were displaced different distances from the median horizontal. Experiment II: Using a rectangle whose varying size reproduced the distances tested in Experiment I, but symmetrically placed with respect to the fixation point, E required S to set 4 dots to a symmetrical rectangular position. Figural after-effects were observed in both cases.

**RESULTS:** Under the conditions of Experiment II figural after-effects were in agreement with "satiation" theory for all positions of the rectangle's edges.

In Experiment I, the non-symmetry had produced an amount of figural after-effect regularly in excess of that in Experiment I, point for point. This excess is attributed to the action of "adaptation to the norm" in Gibson's sense, interacting with, and adding to, the effect of "satiation." (Slides)

### AUDITION

10:00-11:00 AM, Thursday, Osmond 117

W. D. NEFF, Chairman

10:00 AM The duration of an error in speech perception. J. C. R. LICKLIDER, *Harvard University*.

**PROBLEM:** An individual listening under unfavorable conditions to a verbal message makes frequent errors of perception: he hears one word when he should have heard another. The question is, how long does an error last? For how long after missing a word does the probability of missing remain above its average value?

**PROCEDURE:** In order to avoid the confounding effect of verbal context, random sequences of monosyllabic words were used as messages. These sequences were read by a talker, recorded on magnetic tape, and played back to listeners through a distorting circuit that eliminated variations in the talker's voice level and reduced intelligibility to an average level of 60 per cent. Each listener recorded the words as he heard them, and each word on his record sheet was scored 1 (correct) or 0 (incorrect). The binary sequences thus obtained were then examined to find out how long, on the average, error persisted once it appeared. The examination was based on the computation of the autocorrelation functions of the response sequences and of their conditional probability structures.

**RESULTS:** It was found that, for words spaced by intervals of 3 seconds or more, (1) the autocorrelation function drops to zero for a delay of one step and remains at zero for longer delays, and (2) the conditional probabilities of 1 and 0 are the same as the first-order probabilities. Evidently, the correctness of a listener's response to a typical word is statistically independent of the correctness of his responses to previous words.

**CONCLUSIONS:** The duration of an error of speech perception is inherently no longer than 3 seconds.

10:15 AM Auditory flutter. IRWIN POLLACK, *Human Resources Research Laboratories, Washington, D. C.*

**PROBLEM:** In direct comparison with the 'flicker' analogue of vision, a sound interrupted at frequencies below the critical fusion frequency may be said to 'flutter.' A wide-band noise is particularly useful in

the investigation of auditory flutter because no additional audible complicating spectral components are introduced to the sound when it is interrupted. The specific problem investigated was: "Is the conceptual neural mechanism underlying auditory flutter more like that underlying loudness (additive mechanism) than that underlying pitch (substitutive mechanism)?"

**SUBJECTS USED:** 5 experienced listeners.

**PROCEDURE:** The critical test of the conceptual neural mechanism underlying auditory flutter requires an analysis of the subjective size of the j.n.d. of auditory flutter. This analysis requires the following experimental functions: (1) the differential sensitivity to changes in flutter frequency as a function of the reference flutter frequency; and (2) a psychological scale of auditory flutter relating the subjective magnitude of auditory flutter to flutter frequency.

**RESULTS:** The subjective size of the j.n.d. of auditory flutter is not constant but, rather, roughly proportional to the number of j.n.d.'s above threshold. This result parallels that obtained with intensity discrimination (loudness) than that obtained with frequency discrimination (pitch).

**CONCLUSION:** The conceptual neural mechanism underlying the perception of auditory flutter is probably additive (as for loudness) rather than substitutive (as for pitch) in function. (Slides)

This work was done at U. S. Navy Electronics Laboratory, San Diego.

10:30 AM A new determination of differential frequency thresholds. J. DONALD HARRIS and STEPHEN E. STUNTZ, *Medical Research Laboratory, Submarine Base, New London*.

**PROBLEM:** DLs for frequency have never been adequately determined using the conveniences of modern electronics plus the thought which went into the classic psychophysical methods. The best determinations to date used frequency modulation, the results of which are predictable from the nature of the stimulus, assuming the ear to possess infinitely good discrimination. Furthermore, these determinations indicated that frequency discrimination and masking were fundamentally identical, a conclusion suspected on other grounds. Evidently a re-determination of DLs for frequency is needed.

**SUBJECTS:** Six experienced subjects, ages 21-41, with normal hearing.

**PROCEDURE:** DLs were determined at frequencies between 125 and 12,000 cps, at 30 db sensation level. The method of constant stimulus difference was used. Pure tones of 1.5" duration were presented. These tones rose smoothly to 100% within 40 milliseconds and terminated similarly. A 1.5" interval of silence separated the standard and variable tones.

**RESULTS AND CONCLUSIONS:** Striking differences occur between DLs by the method of constant stimulus differences and determinations of discriminability using frequency modulation. At 8000 cps an average DL of well over 100 cps is obtained, compared with 28.8 cycles discriminable by frequency modulation. It is apparent that an integration of DLs from the present data will yield somewhat fewer than the 1500 discriminable pitches usually cited as existing at a comparable intensity level. Again, it appears that DLs become smaller with decreasing frequency, rather than remain constant below 1000 cps as found with frequency modulation. For example, at 250 cps the DL is 0.99 as compared with 1.98 at 500 cps; by frequency modulation the cycles discriminable are constant at 2.7 cps for these two frequencies. Thus the discrepancy is resolved between the observations of Békésy (on the amplitude of vibration of various regions of the basilar membrane) and the facts of frequency discrimination. (Slides)

10:45 AM Histological examination of cochlear structure in the guinea pig following exposure to jet engine noise. IRVING E. ALEXANDER and F. J. GITHLER, *Princeton University*.

**PROBLEM:** In an earlier paper the authors described the initial loss and progressive recovery of electrical function as a result of exposure to jet engine noise. The present report deals with the corresponding effect on cochlear structure with particular emphasis on the Organ of Corti.

**PROCEDURE:** After a fifteen minute stimulation period, 51 guinea pigs were divided into three groups (0-2 days, 6-8 days, and 20-22 days) and tested for cochlear potentials. After test the animals were sacrificed by the intravital perfusion of a fixative solution and the temporal bone removed. Following a period of decalcification and celloidin embedding the ear was sectioned and stained. Every fifth section was retained and mounted in serial order. Each ear was then reconstructed graphically according to the method of Guild and evaluated with regard to the condition of its structures.

**RESULTS:** The results are clearly in support of the hypothesis offered in our first paper. Two kinds of histological damage result from exposure to this type of noise, (a) permanent and (b) recoverable. Both the mean per cent damage and the variability decrease in the several groups as a function of the time interposed between stimulation and test.

In order to show more clearly the complex and variable nature of the effects of jet engine noise, representative results from each of the groups are discussed individually and the various lesions produced are shown.

In addition, evidence has been gathered to clarify the nature of the relationship between the electrical and the histological indices used to indicate the state of the peripheral portion of the hearing mechanism. (Slides)

## CORTICAL FUNCTIONS

11:10 AM-12:10 PM, Thursday, Osmond 117

HARRY F. HARLOW, Chairman

11:10 AM The function of the auditory cortex: the control of learned responses to sound cues. G. PETER ARNOTT and W. D. NEFF, *University of Chicago*.

**PROBLEM:** To determine what factors affect the ability of animals deprived of auditory cortex to discriminate between positions of sound in space.

**SUBJECTS:** Cats.

**PROCEDURE:** Animals were trained and tested in a semicircular enclosure in which was placed a starting box and two food boxes. The food boxes could be moved to any position along the arc of the semicircle. On any given trial, the box which was unlocked was indicated by the sounding of a buzzer placed out of view directly behind the box.

Experimental animals were divided into two groups. Group I was trained and tested before and after bilateral ablation of the auditory cortex. Group II was trained and tested only after operation.

Tests were conducted under the following conditions: (1) room illumination present or absent; (2) relative positions of boxes and buzzers systematically varied.

**RESULTS:** Cats without auditory cortex can make discriminations based on localization of sound in space. Their behavior is distinctly different, however, from that of normal animals. As a tentative hypothesis, it is suggested that the auditory cortex is important in the maintenance of an organized pattern of response elicited by auditory cues. (Slides)

11:25 AM Representation of the two ears at the auditory cortex. MARK R. ROSENZWEIG, *Harvard University*.

**PROBLEM:** To compare the electrophysiological responses evoked at the cerebral cortex by independent stimulation of the two ears. This is part of a study of neural correlates of binaural perception.

**SUBJECTS:** Adult cats.

**PROCEDURE:** E made oscillographic records of the electrophysiological activity of the auditory cortex. For each experimental animal, activity was recorded at several locations on both cerebral hemispheres. Specific electrical responses were evoked at the cor-

tex by stimulating the ears with acoustic clicks. At each location on the cortex, responses were recorded when first one ear and then the other was stimulated. A wide range of click intensities was used in stimulating each ear.

RESULTS: In some respects the cortical representations of the two ears are closely similar:

- (1) The boundaries of the auditory area are the same for both ears.
- (2) The amplitude and waveform of the responses vary with location on the cortex. Generally this variation is parallel for the two ears.

In other respects the representations differ:

- (1) The responses evoked by stimulation of either ear tend to be larger in amplitude at the contralateral cerebral hemisphere than at the ipsilateral hemisphere. There are also characteristic differences in the waveform of responses at the contralateral and ipsilateral hemispheres.
- (2) The thresholds of the responses tend to be a few decibels lower at the contralateral than at the ipsilateral hemisphere.

These results will be discussed in relation to some problems of auditory localization.

11:40 AM Perception of apparent movement across acquired scotomata in the visual field. HANS-LUKAS TEUBER and MORRIS B. BENDER, *New York University College of Medicine.*

Theories of physiological processes which underlie visual perception of apparent movement have emphasized the anatomical point-for-point projection of retina onto striate cortex. Accordingly, apparent movement has been correlated with inferred "isomorphic" cortical processes occurring between successively stimulated regions in area 17. The hypothesis is not denied by the fact that apparent movement is readily seen across the normal blind spot, since the cortical substrate does not have any discontinuity which might correspond to the retinal gap formed by the optic disc. However, a literal conception of "cortical" isomorphism as basis of apparent motion would not predict apparent movement across acquired blind spots (scotomata) due to occipital lesions.

SUBJECTS: (A) Four men with acquired scotomata ("absolute" on perimetry) in various parts of the visual field; all had sustained penetrating gunshot wounds of occipital lobes five to six years before testing. (B) Two men with scotoma due to retinal scars, following penetration of metal fragments into the orbit. (C) Five normal controls. All three groups were tested with alternate exposures of two patches of white light. The experimental conditions permit-

ted variation of retinal position, intensity and size of targets, duration of exposures and intervals between exposures.

RESULTS: (1) All subjects experienced compelling apparent motion, regardless of whether the motion had to "traverse" the normal blind spot, an acquired scotoma of cerebral or retinal origin, or an intact region of the visual field. (2) Thresholds of apparent motion, although different between groups, were not significantly different within each group under conditions where it was obtained across a scotoma, and under conditions where it was obtained in intact regions of the field.

These findings are incompatible with interpretations of "isomorphism" which assume a simple one-to-one correspondence between subjective motion and circumscribed, spatially organized processes in the primary visual cortex. (Slides)

11:55 AM Critical flicker frequency in patients with cerebral lesions. WILLIAM S. BATTERSBY, *New York University College of Medicine.*

Previous investigators have found that critical flicker frequency (c.f.f.) may be depressed after occipital lobe injury; these depressions were greatest in amblyopic areas surrounding a scotoma in the field of vision. On the other hand depressions in c.f.f. after frontal lobe injury have also been reported. To date an adequate analysis of the amount of depression in c.f.f., after each type of injury, has not been made.

In the present experiment fusion thresholds for a 2° and a 30' target were obtained at the fovea, and at 15°, 30°, and 45° of arc in the temporal and nasal fields of one eye. Three groups of ten subjects each were studied. These groups were: (1) Normal control subjects, (2) patients with frontal lobe injury and perimetrically normal fields, (3) patients with occipital lobe injury and complete hemianopsia (homonymous) upon perimetry. The patients in (2) and (3) were tested three to six years after injury. The experimental situation permitted control of light-dark ratio, retinal position, light intensity, duration of exposure, and rate of light intermittence.

RESULTS: (1) No depression in c.f.f. for either target size occurred after frontal lobe injury. (2) After occipital lobe injury a significant depression in c.f.f. was found in the perimetrically normal half field of patients with hemianopsia. (3) Five of the ten patients with hemianopsia could perceive and crudely localize a light presented within their blind fields while the other five could not.

These results indicate the absence of any direct, or permanent, dependence of c.f.f. upon the integrity

of the frontal lobes. The data for the hemianoptics suggest that visual functions are not localized in punctate fashion in the striate cortex; however, this conclusion does not deny the anatomic fact of topological correspondence between retinal and geniculocalcarine structures. (Slides)

### ANIMAL DRIVES

1:40-2:40 PM, Thursday, Osmond 119

KARL M. DALLENBACH, Chairman

1:40 PM Adult feeding and food-hoarding behavior following infantile deprivation in the rat. MELVIN H. MARX, *University of Missouri*.

**PROBLEM:** To determine whether the effects of infantile food deprivation persist to determine adult behavior, as measured by speed of eating and food-hoarding scores.

**SUBJECTS:** Thirty-three weanling albino rats.

**PROCEDURE:** *Infantile Deprivation.* Three groups of eleven rats each, matched for sex and weight within litters, were weaned at 24 days, maintained on unlimited dry mash until 28 days, and then treated as follows:

Group C (control): unlimited food.

Group DL (deprived—*limited* feeding time): ten minute wet mash feedings for ten days.

Group DU (deprived—*unlimited* feeding time): wet mash feedings twice daily for ten days, each rat given the same amount as was eaten by the matched DL animal.

The three matched animals in each set were then caged together, on unlimited food, for thirty weeks. No significant group differences in weight remained.

*Adult Behavior.* All animals were given daily ten minute feedings of wet mash for seven days, and then seven daily food-hoarding tests.

**RESULTS:** On the first adult deprivation feeding both experimental groups ate more than the control, but only the C-DL difference was statistically significant ( $P=0.05$ ). These differences progressively decreased with successive feedings, disappearing by the sixth day. No significant differences were found in the food-hoarding tests.

**CONCLUSIONS:** It is suggested that increased food hoarding by infantile-deprived rats may be mediated through retention of faster feeding habits. If hungry experimental animals feed more rapidly on the first pellets returned they have more adequate opportunity to return additional pellets, within the fixed time of the test, and thus learn to hoard. Lack of hoarding differences in the present experiment may be explained by the reduction of feeding differences prior to the hoarding tests.

1:55 PM Food deprivation and food preference. J.

C. FAY (Sponsored by H. F. HARLOW), J. D. MILLER and H. F. HARLOW, *University of Wisconsin*.

**PROBLEM:** The effects of food deprivation upon the frequency of choices, by rhesus monkeys, of a quantitatively inferior, but qualitatively preferred food reward.

**SUBJECTS:** Nine test-wise rhesus monkeys: three male, three female, and three pregnant female.

**PROCEDURE:** Individual qualitative preferences of five different foods (banana, peanut, bread, potato, and celery) were first determined by the method of paired comparisons. Of these, two were selected: the most preferred and the second least preferred. For eight of the animals these foods were peanut and potato respectively, and for the ninth they were bread and potato. Pieces of preferred food,  $\frac{1}{2}$ ,  $\frac{1}{4}$ ,  $\frac{1}{8}$ , and  $\frac{1}{16}$  the size of a peanut, were paired with 2 or 4 pieces of potato and presented to the monkey for choice. Each of the 10 possible combinations were presented, at random, 5 times daily. The three conditions of food deprivation studied were 1, 23, and 47 hours. The experiment was divided into three periods of 200 trials each, and in each period a male, a female and a pregnant female monkey was tested under each of the three conditions of food deprivation. At the close of the experiment all animals had been tested under each time of deprivation.

**RESULTS:** It was found that marked variations in time of food deprivation are without effect upon choices in a quantitatively and qualitatively unbalanced preference situation. Practice and type of animal were similarly unimportant. The data suggest quantity and quality operate independently in the determination of the overall preference of a given reward, for the effects of doubling the magnitude of the potato were compensated for by doubling the magnitude of the peanut or bread. These results were not a function of deprivation conditions. (Slides)

2:10 PM The afferent neural determinants of the specific hunger for salt. CARL PFAFFMANN, *Brown University*.

Previous investigations have shown that the normal laboratory rat will prefer salt solutions to water when both fluids are available. The amount of salt ingested is a nearly linear function of the concentration from 0.06% to 1.0% NaCl. Beyond these values the preference changes to an aversion which becomes maximal at a concentration of 3.0% and above. The preference for salt solutions of different concentration may be exaggerated in a condition of salt need (adrenalectomy) and depressed following an increase in the salt content of the diet.

The gustatory nerve discharge to these same solutions may be studied by electrophysiological methods. The total discharge in the chorda tympani nerve may be recorded and integrated by an appropriate electronic device. This yields a measure proportional to the total density of the afferent nerve discharge (summation of frequency per fiber and number of fibers active). The threshold concentration for the nerve discharge is 0.02% (approx.). The nerve discharge reaches a maximum at about 3.0%. It is between these values that changes in the salt preference occur.

The quantitative relation between the afferent discharge and the degree of preference will be described and discussed. (Slides)

This research is supported in part by the Office of Naval Research under project NR 140-721.

2:25 PM Hormonal control of sensory receptors.

FRANK A. BEACH and GILBERT LEVINSON, *Yale University*.

PROBLEM: To examine the effects of castration and androgen treatment upon the integument of the glans penis in rats.

SUBJECTS: 32 castrated male rats.

PROCEDURE AND RESULTS: The animals were divided into 4 equal groups three of which received daily injections of testosterone propionate, while the fourth received inert oil. Two animals from each group were sacrificed after 7, 14, 21 or 28 days of treatment; the glans was sectioned and stained. Within 2 weeks after castration the histological condition of the integument of the glans penis in non-injected cases was devoid of the projecting, cornified spikes that characterize the normal animal. Administration of 25 or more micrograms of androgen per day maintained the glans in normal condition. Five micrograms prevented complete regression of the glans but the number of spikes was reduced. The spikes have no direct nerve supply, but numerous touch corpuscles lie directly beneath them.

CONCLUSIONS: It is suggested that the spikes act as accessory sensory structures. It seems probable that during copulation they are displaced by friction against the vaginal walls. The resulting distortion of underlying tissues would then initiate a discharge of sensory impulses from the touch corpuscles. It is known that copulatory behavior declines markedly after castration unless androgen is administered, and present results suggest that the behavioral change may be due in part to decreased sensitivity in the glans penis. Comparison of the results of this experiment with those of an earlier study shows that the amount of androgen necessary to maintain normal mating behavior is the same as that which prevents regressive changes in the glans.

## REPORT FROM THE CONFERENCE ON BEHAVIOR THEORY

2:50-5:00 PM, Thursday, Osmond 119

FRED MOSTELLER, Chairman

Invited papers by representatives from the SSRC session on learning theory: William K. Estes, Sigmund Koch, Kenneth MacCorquodale, Paul E. Meehl, Conrad G. Mueller, William N. Schoenfeld, and William S. Verplanck.

Discussion from the floor will be invited.

## LEARNING—I

8:50-9:50 AM, Friday, Osmond 119

DAVID A. GRANT, Chairman

8:50 AM Double alternation behavior in mental defectives. L. M. STOLUROW and G. R. PASCAL, *University of Pittsburgh*.

PROBLEM: To repeat Hunter and Bartlett's study (1948) of double alternation behavior in normal children with a group of feeble-minded S's roughly comparable in M.A.

SUBJECTS: Twenty-six male feeble-minded S's, ranging in C.A. from 6 to 32 years and in M.A. from 2-1 to 8-7, were trained on a double alternation box-apparatus.

PROCEDURE: The apparatus contained two boxes, three inches apart. The stimulus objects were small bits of candy of uniform size. The S's were asked to play a game and after opening and closing the box tops, the E said, "I'll put candy in the boxes." And then, "Shall we begin?" The boxes were closed and E put a piece of candy in the correct one. If the S opened the correct box, he could remove the candy, eat it, or keep it as he chose. The other box was empty. After eight responses, rrlrrll, during which S received eight pieces of candy, E said, "Let's stop now." And after 15 sec. said, "Let's begin again." A maximum of 48 trials or 192 responses were permitted. The criterion of learning for all S's was three correct successive series of eight responses. After attaining the criterion, the S's were asked how they solved the problem.

RESULTS: 1. Positive correlations were found with ability to delay in a delayed reaction test and with M.A., P.A., I.Q., and P.Q. 2. S's with M.A. as high as 5-3 did not solve the problem and lowest M.A. solving the problem was 5-10. These results support those of Gellerman (1931). 3. The double alternation problem was not as well adapted to the younger S's as the delayed reaction test. 4. Solution of the prob-

lem did not always indicate ability to verbalize the correct pattern of response. (Slides)

9:05 AM Effects of electroshock on retention of the double-alternation problem in the temporal maze.

FRANCIS H. PALMER, *Allegheny College*.

PROBLEM: Previous animal studies have suggested that the decrement in retention subsequent to a series of electroconvulsive shocks may be a function of the complexity of the task. The present study was designed to test retention near the limit of the rats' learning ability. Since it has been shown recently by the author that some rats can learn the RRL pattern of the temporal maze without extraneous cues, that task was chosen.

PROCEDURE: Forty 100 day old albino rats and eight cats were trained on the double alternation problem of the temporal maze. Animals were maintained at 75% body weight and were rewarded with food at the end of each leg of a trial. Twenty of the forty rats and all of the cats learned the problem to a criterion of three perfect trials. Those who had not learned in 300 trials were discarded. One-half of these animals, ten rats and four cats, were then given a series of 25 daily electroconvulsive shocks while their controls rested. A seven day rest followed the last shock.

RESULTS: All animals then attempted to relearn the maze. Five of the shocked rats had not relearned when they had completed a number of trials equal to the number needed for initial learning; the remaining five relearned with from 10% to 35% savings. All the controls relearned with from 95% to 35% savings. The eight cats relearned, with the shocked animals showing only a slight decrement over the controls.

CONCLUSIONS: These data with rats support the hypothesis that decrement of retention following electroconvulsive shock is a function of the complexity of the task. The lack of a significant difference between shocked and control cats might be explained by assuming that the task was more simple for this animal.

9:20 AM Influence of personal values on learning.

CHARLES N. COFER and DEAN HAVRON, *University of Maryland*.

PROBLEM: To determine whether learning of value words is influenced by the personal values of the learner.

PROCEDURE: 16 Ss were selected whose scores on the Allport-Vernon Study of Values were high for religious values and 16 were selected whose scores were high on political and economic values. These Ss learned two lists of 16 paired associates in counter-

balanced order. In one list the response words were religious words and in the other list were political-economic words. Scores recorded were: number of correct responses per trial, errors per trial, and latency of response words.

RESULTS: Differences were obtained in the directions to be expected from similar studies of perceptual processes. The errors made during the course of learning tended to be substitutions of covaluent for contravaluent words. Latency of response was shorter when words to be learned were covaluent than when they were contravaluent. A difference emerged on the first learning-recall trial in that a larger number of covaluent words were correctly recalled than of contravaluent words, but this difference did not reach significance. These data are interpreted in terms of a theory of verbal response availability and of verbal response systems. This study was performed under a contract with the Office of Naval Research. (Slides)

9:35 AM A study of direction in problem solution.

ABE J. JUDSON and CHARLES N. COFER, *University of Maryland*.

PROBLEM: To determine whether the activation of a verbal response system by a verbal stimulus will determine the direction of problem solution.

SUBJECTS: 125 college students of both sexes.

PROCEDURE: A test consisting of 45 items was constructed. Each item consisted of four words, capable of classification into two groups of three words each. S's task was to select the word that "didn't belong." For example, one item contained the words prayer, temple, cathedral and skyscraper. A second form of the test was developed, in which the order of words in 12 of the items was changed; for example, skyscraper, temple, cathedral and prayer. Different groups of Ss took the two forms, under instructions to work rapidly and with a brief time allowance.

RESULTS: Study of the 12 items in which word order was changed revealed that the word excluded as "not belonging" was a function of the order in which the words were listed. 9 of the 12 items showed a difference of this type, several at the 0.001 level of confidence. Thus, in the above example, if prayer was the first word, skyscraper was excluded and conversely. These findings are interpreted to mean that when a verbal stimulus activates a verbal response system the latter can determine problem solution. (Details of this interpretation will be presented.) Other possible explanations, such as position sets, may be rejected on the basis of controls provided by the design of the test. These will be described. This study was performed under a contract with the Office of Naval Research. (Slides)

## LEARNING—II

10:00-11:00 AM, Friday, Osmond 119

FLORENCE L. GOODENOUGH, Chairman

10:00 AM Performance of a serial paired-associate motor task. CAROL H. AMMONS and ROBERT B. AMMONS, *University of Louisville*.

PROBLEM: To determine the characteristics of performance on a serial paired-associate motor task and compare these with known characteristics of serial verbal learning tasks.

SUBJECTS: 32 male and 32 female college students.

PROCEDURE: Ss learned a series of 16 paired switches to a criterion of two perfect repetitions. Switches were arranged in two concentric circles of 8 each on a large board. Starting switch position was systematically rotated to make possible the determination of relative pair difficulty, and the effects of the relation between starting position and top of board. When the correct members of a pair were switched on in immediate sequence, a buzzer sounded.

RESULTS: No statistically significant difference was found in trials to learn between men and women Ss, and between Ss run by one E and those run by another. The easiest switches to learn were the top right switch and the first switch in the series learned by a given S. Only slight evidence was found for a serial position effect. Little difference in performance was found between Ss using verbal cues and those not using them. The series was learned to criterion in about fifty trials.

CONCLUSIONS: This kind of motor series seems to take more trials to learn than would a list of adjectives or nonsense syllables of the same length. It cannot be considered as comparable to a verbal serial list, since little or no serial position effect was observed. Further comparisons of serial motor tasks with verbal tasks are indicated.

10:15 AM Response similarity and degree of first-list learning in associative facilitation and inhibition. BENTON J. UNDERWOOD, *Northwestern University*.

PROBLEM: Previous experiments in verbal learning have shown that with identical stimuli in two successively learned lists, variations in response similarity produce marked changes in transfer. If response generalization is an appropriate explanatory mechanism for such results, changes in transfer effect must be predicted as degree of first-list learning is varied; specifically, the greater response similarity and degree of first-list learning, the greater associative facilitation.

PROCEDURE: The learning material consisted of paired-associate lists of 12 two-syllable adjectives con-

structed by Haagen. Nine conditions were run by using three experiments of three conditions each. In each experiment three degrees of response synonymy between the two lists were used, with stimuli always identical. In Exp. I the first list was learned until S correctly anticipated 4 responses; in Exp. II the criterion was 7 responses, and in Exp. III, two successive perfect trials. The second list was always learned to a criterion of 7 out of 12 correct responses. A total of 54 Ss were used, 18 in each experiment. In each experiment the three experimental conditions were counterbalanced against practice effects.

RESULTS AND CONCLUSIONS: 1. In learning the second list, associative facilitation was directly related to degree of first-list learning and similarity.

2. An analysis of the first anticipation trial of the second list showed that as similarity increased the probabilities of a correct anticipation on the second list increased directly, but as first-list learning increased, the probabilities first increased and then decreased.

3. Intrusions from the first list occurred with maximal frequency when degree of learning was moderate and response similarity high.

4. These results support the use of response generalization as an explanatory device. (Slides)

10:30 AM Vocalization and speech in chimpanzees.

KEITH J. HAYES, *Yerkes Laboratories of Primate Biology*.

PROBLEM: Why don't chimpanzees talk? Can they be taught to use speech by special training?

SUBJECTS: Two young laboratory chimpanzees, and one young chimpanzee (Viki) who has been raised like a human child.

PROCEDURE: The subjects were stimulated emotionally, and rewarded with food whenever they made a vocal response. Viki was given additional training in the pronunciation and appropriate use of words.

RESULTS: All three chimpanzees soon showed signs of knowing what was expected of them, but had great difficulty in learning to make the required response. After 6 months of training, one of them could produce a faint whine only occasionally, and with difficulty. The other two learned, after 2 and 5 months, to make a hoarse, unnatural sound quickly on command, but with some effort.

Viki learned to say "mama" after 2 weeks of motor-kinesthetic training. She later learned, by imitation, to pronounce whispered approximations of the words "papa," and "cup." These two words were made up of unvoiced sounds which she had previously made spontaneously, in play.

Viki next learned to use her three words correctly in solicitation, being rewarded only when the appropriate experimenter was addressed as "mama" or

"papa." She was given something to drink only when she said "cup." She ordinarily uses the proper word, at present, but often becomes confused when too strongly motivated.

**CONCLUSION:** Our results suggest that the chimpanzee's failure to talk is not due to inadequate speech organs or general intelligence, but rather to a neurological condition similar to aphasia. Chimpanzees, like human aphasics, can be taught to speak, but only with considerable difficulty.

This research was conducted in collaboration with Catherine Hayes, and was supported by a grant from the American Philosophical Society.

10:45 AM The identifying response. A study of a neglected form of learning. ELEANOR J. GIBSON and JAMES J. GIBSON, *Cornell University*.

The learning of identifying responses for the objects and events in his environment is a basic accomplishment of the child, on which further learning depends. *An identifying response is any response which is specific to a particular object* (actually to a class of similar objects). *Identification is said to occur when stimuli which were once undifferentiated are now uniquely reacted to* (actually when the original class of equivalent objects is diminished).

An example is the reaction of an infant to the sight of a human face, at first to any face and later to individual faces. Progressive identification similarly occurs in animals. A special type of identifying reaction which develops in human children is the naming response. Naming substitutes for the identifying of objects by overt use-responses, and this progresses to the identifying of abstract features of objects (classifying), and to the transfer of previous discriminations from old to new situations.

Classical experiments for which identification constitutes a major part of the learning process are discrimination-learning in animals, paired-associates learning in human subjects (faces and names, nonsense items, code-learning) and the aircraft recognition experiments. This theory of identifying responses throws a new light on the controversy over "continuity" vs. "discontinuity" in discriminative learning.

Experiments on identification learning in adult human subjects are reported which reveal the following characteristics of the process: (1) The stimulus-generalization decreases (*i.e.*, the original class of equivalent objects diminishes). (2) Abstract features among a set of objects are themselves named or identified and this facilitates the identifying of these objects. (3) Once the abstractions have been identified, they mediate transfer in the identifying of new objects.

It is concluded that the study of the identifying response will bring simple discrimination-learning into line, theoretically, with meaning and concept-formation.

## LEARNING: SOME METHODOLOGY

11:10-11:55 AM, Friday, Osmond 119

CARL PFAFFMANN, Chairman

11:10 AM Two methods of evaluating the sequential structure of vowels and consonants. EDWIN B. NEWMAN, *Harvard University*.

In an effort to compare the usefulness of various statistical measures of sequential dependencies in human behavior, an analysis was made of equivalent samples from the Bible in six different languages. In the first method, autocorrelation functions were calculated up to nine steps. The second method involved the computation of the measure of redundancy, *C*, suggested by Shannon.

The results show a markedly periodic pattern of vowels and consonants in all languages. The length of the period changes markedly as a function of language. In some cases it is possible to fit the autocorrelation function with a highly damped cosine function. The relation of these measures, namely, period and damping, to the redundancy measure will be discussed. (Slides)

11:25 AM A factorial analysis of precision, steadiness, and equilibrium in fine motor skills. ROBERT H. SEASHORE and FRANK J. DUDEK, *Northwestern University*.

**PROBLEM:** To determine the nature of the factors underlying performance in various fine motor tasks emphasizing precision, steadiness, and equilibrium.

**SUBJECTS:** 108 university undergraduates.

**PROCEDURE:** On three separate testing days subjects' performances were measured on six instruments designed to measure various aspects of fine motor skills. Twenty-one scores were determined. Instruments used and types of performances measured were: Universal Ataxiometer: body-sway, standing and sitting, eyes open and closed; Arm-hand Ataxiometer: arm-hand steadiness; Straight Tracing Test; Rod-and-ring Three Dimensional Tracing Test; Tridimensional Balancing Chair; turn, climb, and bank scores; Miniature Aeroplane Test: turn, climb, and bank scores. The twenty-one measures derived were intercorrelated and factorially analyzed by means of the centroid method.

**RESULTS AND CONCLUSIONS:** Six factors were extracted and rotated with criteria of positive manifold and simple structure in mind. Interpretations of the

rotated factors suggested they were associated with: (I) Standing postural sway, (II) Sitting postural sway, (III) Arm-hand steadiness, (IV) Precision in slow movement of the arm and hand, (V) Dynamic equilibrium, (VI) Complex visuo-motor coordination. The six factors were not uncorrelated. Estimated intercorrelations suggested at least three underlying factors: (A) underlying factors I, II, and III; (B) underlying factors III and IV; (C) underlying factors V and VI. The relationships among tests of fine, motor, movements (often designated as "steadiness" tests) cannot, apparently, be explained in terms of a single, general factor of "steadiness." These results tend to confirm a previous study carried out with a different battery of tests.

11:40 AM Displacement in ESP card tests in relation to hits and misses on the assigned targets.

J. G. PRATT, *Parapsychology Laboratory, Duke University.*

The basic data of a typical ESP card test consist of a series of responses, or calls, by the subject and a parallel series of randomly-ordered cards. Each call represents an effort on the part of the subject to identify the card coming at that point in the series,

the assigned target for that trial. It was discovered, however, that the calls of some subjects were related to cards coming earlier or later in the target series. Evidence for this effect, which is known as ESP displacement, was first reported by C. G. Abbot in 1938. Since then the discovery has been widely confirmed.

Currently, the study of accumulated ESP data is providing further evidence for displacement and throwing light on its nature. This paper will present some of the findings from one subject, C.J., from the extensive University of Colorado experiments of Martin and Stribic (1940). The data examined for displacement consist of 300 runs of tests for clairvoyance made with the standard ESP cards screened from the subject. A highly significant rate of success in hitting on the assigned targets was reported by the experimenters. In the present research, significant displacement results were found, and this effect was studied in relation to hits and misses on the assigned targets. (1) The targets that were missed by the calls intended for them were missed to a statistically significant extent by the immediately preceding calls. (2) On the other hand, there was a tendency for targets that were hit by the calls intended for them to be hit by the immediately preceding calls.

## DIVISION ON EVALUATION AND MEASUREMENT

### ORGANIZATION OF ABILITIES

8:50-9:50 AM, Monday, Osmond 119

JOHN B. CARROLL, Chairman

8:50 AM Application of factorial logic to spatial abilities. CHARLES I. MOSIER, J. E. UHLANER, and BERTHA P. HARPER, *Personnel Research Section, AGO, Department of the Army.*

PROBLEM: Through the application of factorial methodology to isolate one or more spatial factors from a set of 91 spatial relations items.

SUBJECTS: The population consisted of three subgroups (all stratified on a general classification test) as follows: (a) 500 Army enlisted men, (b) 400 Army enlisted men, (c) 264 Navy enlisted men.

PROCEDURE: In the development of the Armed Forces Qualification Test, presumed spatial abilities items were included that had been written to represent seven major a priori types. The data were analyzed to investigate the hypotheses underlying the a priori item types. The method of analysis involved the selection of a set of items (approximately ten) most clearly representative of an item type. For Population A, the intercorrelations (tetrachoric) among these items were computed and the matrix tested for rank one. If necessary, the set of items was

revised until a set was obtained whose intercorrelations could be explained by a single factor. (It might be noted that inclusion of items with widely differing p values did not preclude the rank of the matrix being one.) Once such a single set had been identified, each of the 90 items was correlated with total score on the set and used in the interpretation of the nature of the single factor identified by the items defining the set. For all three populations, the intercorrelations of the scoring keys in the populations with the other variables were also computed and interpreted.

RESULTS: The abilities involved in the "spatial" type of items reduced to two clearly defined factors and one less clearly defined. The pattern of relationships with other variables, such as vocabulary, arithmetic, pattern analysis, mechanical aptitude, clerical aptitude, will be discussed also.

9:05 AM Trait relationships among six-year-old children. SONIA A. AVAKIAN, *Fordham University.*

PROBLEM: The purpose of this paper was to investigate trait organization in young children, with special reference to the relative prominence of general, group, and specific factors. A secondary aim was to compare the trait organizations of boys and girls within the total sampling.

**SUBJECTS:** The subjects were 511 beginning first-graders in a public school in Tarrytown, New York, and three public schools in New York City, including 271 boys and 240 girls. The group was relatively homogeneous in age, education, and socio-economic background. All schools were in middle-class neighborhoods. Age ranged from 5-7 to 6-5, with a mean of 6-1, and IQ ranged from 86 to 118, with a mean of 101.

**PROCEDURE:** Twenty-four subtests selected and adapted from the Metropolitan Readiness Test, Pintner-Cunningham Primary Test, and Thurstone's Tests for Primary Mental Abilities were administered to groups of 12 to 28 children. Testing sessions varied from 25 to 60 minutes.

Intercorrelations were found for the total group and for boys and girls separately. The data for each of the three groups were analyzed by Thurstone's centroid method. The axes were then rotated into oblique patterns which best met the conditions of simple structure and positive manifold. Intercorrelations of reference as well as ability vectors were found.

**RESULTS:** Three factors were isolated for the total group, tentatively identified as Verbal Comprehension, Numerical, and Pictorial-Spatial. The first has the highest loadings in vocabulary and sentence comprehension tests. The Numerical Factor, occurring in tests of number concepts and computation, appears to involve accuracy of observation at this age level. The third factor involves both pictorial and more abstract spatial relations. The appreciable correlations found between these three primary abilities suggest the existence of a possible second-order general factor.

9:20 AM Factorial content of training criteria. BENJAMIN FRUCHTER, *University of Texas*.

**PROBLEM:** To estimate the factorial content of the final-grade criterion for thirteen Air Force technical training schools.

**SUBJECTS:** The sample for the factor analysis of the classification battery consisted of 389 airmen assigned to technical schools. Each technical school was represented by a random sample proportionate to the number of airmen previously assigned to it. For the factor estimations of the technical-training criteria, the sample consisted of the graduates of each technical school.

**PROCEDURE:** A factor analysis of the Airman Classification Test battery (14 variables), part scores of the AGCT (4 variables), and the AG Mechanical Aptitude-2 test yielded the following six factors: numerical-facility, verbal comprehension, socio-economic background, visualization, mechanical experience and perceptual speed.

Validity coefficients for each of the nineteen variables referred to above, against the final-grade criterion, were obtained for thirteen AF technical specialties (*e.g.* weather observer, radio operator, aircraft-and-engine mechanic, clerk-typist, etc.); the factor content of each criterion was estimated in turn by the method for estimating the factor loadings of a variable not included in the original analysis reported by Dwyer.

**RESULTS OR CONCLUSIONS:** Factor profiles for the technical-training criteria showed considerable differentiation (*e.g.* A & E mechanic is high on mechanical-experience, moderate on visualization, and low on the other factors; clerk-typist is high on numerical, moderate on verbal and low on the other factors). Estimates of the reliabilities of the criteria were not available. Communalities, however, varied from 0.60 to 0.10, the latter amount probably reflecting the unreliability of some of the criteria.

A number of possible applications of the results, such as obtaining estimates of the correlations among the criteria and the establishment of job families based upon similar profiles of aptitudes, will be discussed. (Slides)

9:35 AM What do paper formboards measure? MILTON S. GURVITZ, *Hillside Hospital*.

**PROBLEM:** Tests such as the Minnesota Paper Formboard are reputed to measure mechanical ability primarily. On the other hand, paper formboards are constituent parts of intelligence tests such as the Beta and the USPHS Classification test. What then do paper formboards measure?

**SUBJECTS:** 1000 successive male admissions to a penitentiary.

**PROCEDURE:** The Revised Minnesota Paper Formboard (RMPF) is complex and requires 20 minutes, the paper formboard of the Classification test requires 10 minutes and is of medium difficulty, the Beta paper formboard takes 4 minutes and is simple. These measures were correlated with each other and with various intelligence and educational factors and compared with correlations of the RMPF which average around 0.40 with mechanical aptitude.

**RESULTS AND CONCLUSIONS:** Correlations of RMPF with Alpha 0.685; Beta 0.71; Classification Test 0.80; education 0.46; Stanford Achievement Test 0.58; formboard, Classification test 0.68; formboard, Beta 0.62.

Correlation of Beta formboard with: Classification test formboard 0.74; education 0.49; Beta 0.75; Classification test 0.79; Stanford Achievement test 0.61.

Correlation of Classification test formboard with: Classification test 0.89; education 0.44; Alpha 0.62; Stanford Achievement test 0.54.

It appears that paper formboards are primarily tests of intelligence and general cultural level and only secondarily tests of mechanical ability. Intercorrelations between the paper formboards are lower than expected. It appears that as paper formboards increase in complexity the factors measured also change although a large component of general intelligence is retained.

It is a reasonable hypothesis that non-verbal tests of intelligence would have as high a correlation with mechanical ability as those reported for the RMPF.

### SYMPOSIUM: ON EVALUATING PRODUCTIVITY IN RESEARCH

10:00 AM-12:10 PM, Monday, Osmond 119

(Co-sponsored with Division 19. See Division 19's program.)

### ITEM ANALYSIS

1:40-2:40 PM, Monday, Osmond 119

FREDERICK B. DAVIS, Chairman

1:40 PM An analysis of associates and superiors criterion ratings. EVA RUSSELL and HUBERT E. BROGDEN, *Personnel Research Section, AGO.*

PROBLEM: To determine: (a) the relationship between ratings made by superiors and subordinates, and (b) the effect of opportunity to observe upon reliability.

POPULATION: 365 non-commissioned officers of the U. S. Army.

PROCEDURE: Rating forms including a number of scales measuring traits considered to be important for success of non-commissioned officers were administered to superiors and subordinates of 365 non-commissioned officers. For each scale, raters indicated their opportunity to observe the characteristic, and its importance to overall efficiency.

Scale reliabilities were determined separately for two groups of raters: those indicating much opportunity to observe and those indicating some or little opportunity. Ratings of the different raters were averaged on each scale, greater weight being given when rater indicated more opportunity to observe. These average ratings were then intercorrelated and factored.

Average intercorrelations, reliability, distributions on opportunity to observe and judged importance were also computed for each scale.

RESULTS AND CONCLUSIONS: The results from the factor analysis indicated that a single scale was as good as the composite of a number of scales each purportedly having its own specific content since: (a) a general factor and two common factors each specific

to supervisors and subordinates accounted for the major portion of the common variance; (b) additional factors were of low contribution and could not be meaningfully identified with scale content; (c) no doublets between scales of identical content were evident in the residuals.

The fact that raters indicating greater opportunity to observe gave more reliable ratings suggests that ratings can be improved by selecting raters who indicate good opportunity to observe.

Sally Greenberg and Conrad Chyatte collaborated in this study.

1:55 PM Keying biographical inventories in classification test batteries. WILLIAM B. LEZCNAR and JOHN T. DAILEY, *Directorate Personnel Research, Human Resources Research Center, Lackland Air Force Base.* (Sponsor, John T. Dailey)

PROBLEM: To determine empirically the results obtained from two techniques for keying biographical information used as one variable in a classification battery.

SUBJECTS: 2000 airmen, graduates and eliminees, of the Air Force Clerk-Typist School; 352 and 585 airmen, graduates and eliminees, of the Air Force Airplane and Engine Mechanic, Conventional and Jet, Schools respectively.

PROCEDURE: Final average technical school grade was selected as the criterion for validation purposes. From item analysis data, scoring keys were prepared for a Biographical Inventory by the "pattern of response" method where gradients of phi coefficients are considered for the responses to an item as a whole, and by the "conventional" method where responses for each item are evaluated independently according to the level of significance of the phi coefficients. The keys were used to score the papers in the sample on which the keys were based, and cross-applied to an independent sample of papers. The two methods of keying were compared on the basis of validity, cross-validity, and contribution to prediction in composite with certain tests.

RESULTS: The "pattern of response" key for the Biographical Inventory yields as high validity for the sample on which the key was based as does the "conventional" key; it tends to maintain that validity when the key is used to score successive samples of the population, whereas the "conventional" key shrinks in validity on independent samples.

CONCLUSIONS: The "pattern of response" key apparently minimizes chance variance. It appears particularly useful as a technique when the scoring of biographical items is to be determined from item analysis data obtained on samples ranging from 100 to 500 cases.

2:10 PM Willingness to make negative responses as a measure of maturity. WARREN G. FINDLEY, CHARLES T. MYERS, and MARY N. CROSS, *Educational Testing Service*.

**PROBLEM:** Ratings on "adaptability for the service" at the U. S. Coast Guard Academy are apparently reliable measures not related to academic grades or to aptitude or achievement test scores. It is suggested that maturity is a quality that may be related to "adaptability" and that willingness to give negative answers in a test may be a measure of maturity, as suggested by Strong and others.

**SUBJECTS:** Approximately 150 entering cadets in each of two consecutive classes.

**PROCEDURE:** Various multiple-choice tests (Synonyms, Figure Analogies, Mathematics, and Spatial Relations) were administered with two separately timed parts each. Every item included the answer option that none of the choices given were correct. In the first part of each test, each of the options was correct an equal number of times; in the second part, the negative response was correct for half the problems. The negative response score derived for each test was twice the number of correct negative responses in the second part less the total number of correct responses in the first part. These scores are to be correlated with ratings on "adaptability," grades, and entrance tests. As a check on whether the negativeness or simply the excessiveness of the excess negative answers is responsible for the phenomena found in negative response tests, a parallel study is being made using a different response excessively in one test.

**RESULTS:** Results of item analyses, which show positive bi-serials between negative response items in the first parts of two tests and the negative response scores for the tests, and the correlation of  $0.31 \pm 0.10$  between negative response scores on a verbal test and a non-verbal test, indicate a negative response trait is being measured. Validity data and more intercorrelations will be available this summer.

This study is one of a series being made by Educational Testing Service under contract with the U. S. Coast Guard Academy.

2:25 PM Scale items for inclusion in forced-choice rating forms. JOEL T. CAMPBELL and EDWARD A. RUNDQUIST, *Personnel Research Section, AGO, Department of the Army*.

**PROBLEM:** In constructing efficiency rating scales of the forced-choice type the problem arises on what basis the preference and discrimination indices should be obtained. Several methods of obtaining these indices are possible. It is the purpose of this study to compare four methods of obtaining preference indices and three methods of obtaining discrimination indices.

**POPULATION:** Each form was completed by from 200 to 300 Regular Army officers.

**PROCEDURES:** Four preference indices were compared. Two concerned the extent to which the phrase is used to describe (a) designated subordinates and (b) undesignated officers well-known to the rater. The remaining two concerned willingness (a) to use the phrase in describing a subordinate who would see the rating and (b) to promote men described by a particular phrase. This last method is, in effect, using the appearance of validity as a preference index.

The three discrimination indices which were studied for relationship of the item to: (a) a signed overall rating scale completed by the same officer who completed the check list; (b) an unsigned overall rating scale completed by the same officer who completed the check list; (c) an external criterion—in this instance, the average of a number of associate ratings of value to the Army.

Two sets of 292 items were combined with four sets of instructions to make eight check lists from which the indices above were obtained. Approximately half of the items were favorably stated and the other half unfavorably stated. The correlation matrices for the indices were computed for favorably and unfavorably stated items separately.

**RESULTS:** Analysis tentatively suggests that the best results are obtained by using the relationship to an external criterion as the validity index and "willingness to promote" as the preference index.

## APPLICATIONS OF TESTS

2:50-3:50 PM, Monday, Osmond 119

ROBERT T. ROCK, Chairman

2:50 PM Hypotheses regarding selection methods for supervisory and executive selection. MILTON M. MANDELL, *United States Civil Service Commission*. (Sponsor, E. S. Primoff)

**PROBLEM:** Development and validation of selection methods for management positions from first level supervisory positions to top level executive positions.

**SUBJECTS:** Approximately 1,000 supervisors in trades and clerical positions in various Federal establishments; approximately 250 staff and line administrative personnel in various Federal agencies.

**PROCEDURE:** Study of the literature; analysis of job content; analysis of reasons for failure in executive and supervisory positions; preparation of predictors; administration of predictors; obtaining of criteria data; statistical analysis.

**RESULTS OR CONCLUSIONS:** The most effective supervisory tests seem to be mental ability, supervisory judgment, reading comprehension, agency organization, personnel and policy, Kuder preference record,

personnel analysis, supervisory attitudes, name and number checking for clerical supervisors, and mechanical comprehension and paper form board for trade supervisors. The most desirable written tests for executive selection seem to be the Strong interest inventory, the Allport-Vernon Scale of Values, administrative judgment, personnel analysis, agency organization, personnel and policies, and group oral performance test.

**HYPOTHESES:** (1) A supervisor needs a high level of the aptitudes required in the jobs he is supervising. (2) Part of a selection battery for executives should involve an evaluation of him in a group situation. (3) There is no upper limit to the intelligence requirements of a true executive position but there is an upper limit and a lower limit to the intelligence requirements of a supervisory position. (4) The level of personality characteristics, mental ability, and technical knowledge needed for supervisory positions is relative to the amount of these characteristics in their subordinates. (5) Criteria for evaluating supervisory effectiveness in validation studies should be obtained from the superiors and subordinates of the supervisors being studied. (6) The evaluation of the effectiveness of executives should be obtained from subordinates, superiors, and those groups outside the organization they deal with.

3:05 PM A scale of religious development. CHARLES C. JOSEY, *Butler University*.

The scale is designed to measure the kind of religious development that makes for happiness, mental health, and social effectiveness. Part I consists of fifty items designed to learn the importance attached to various religious experiences, attitudes, beliefs, and practices by the respondent. Part II consists of fifty items designed to learn what influences have been important in the respondent's religious development. The questionnaire has been administered to several hundred students, many of whom are over thirty-five, and to three church congregations or organizations.

High coefficients of reliability have been obtained by the retest, split-half, and the part-whole methods. The validity of the scale is indicated by an item analysis and by the following data: The coefficients of correlation between the two parts cluster around 0.55. Students preparing for the ministry make considerably higher scores than other students. Church members make higher scores than non-church members. The correlation between frequency of church attendance and scores, based on averages, is almost perfect. In church congregations there is a significant correlation between scores and age. The same is true of college students.

Since no effort has been made to disguise the significance of any item, the question of honesty is raised.

An analysis of the possible causes of honesty and dishonesty and the above data indicate that the problem of honesty can be handled, if proper efforts are made to gain the cooperation of the respondents. As for the counselor, he should be able to learn much from the scale whether the respondent is honest or dishonest.

The scale should be of value to ministers, religious educators, students of religion, and to counselors.

3:20 PM Preliminary career guidance of newly commissioned Air Force officers. PAUL M. FREEMAN, *Air Tactical School*.

The United States Air Force has adopted a policy of placing its officer personnel in careers for which they are best suited by ability, interest, and desire. The Air Tactical School of the Air University was given the assignment of recommending careers for those newly commissioned Academy graduates and Distinguished Military Graduates of civilian institutions who received their baccalaureate degrees in June of 1949 who elected to join the Air Force Officer Corps.

The procedures included:

- a. Setting up a career guidance board.
- b. Defining the various possible career areas open to Air Force officers.
- c. A test program which included the Graduate Record Examination, parts of the Aircrew Classification Test, Army General Classification Test, and the Strong Vocational Interest Blank.
- d. Preparation of a career guidance folder for each officer.
- e. A two hour interview with each newly commissioned officer.
- f. Recommendation of career area and alternative initial job assignment for the officers.
- g. Preparation of a detailed report of the activities of the career guidance board.

Research has been projected to refine and expand the officer career guidance program. This research is under the sponsorship of the Air Force Human Resources Research Institute.

3:35 PM Learning of Biblical facts in college correlated with pre-college learning and intelligence and general culture test scores. CLARA CHASELL COOPER, *Lebanon Valley College*.

**PROBLEM:** To evaluate the effectiveness of Sunday School instruction by comparing scores on a test of Biblical knowledge made by Freshman women soon after entering college with scores on the same test at the end of a required course in Bible; and to ascertain the relation between acquisition of Biblical knowledge and other factors in three groups of college women.

**SUBJECTS:** Two groups of Freshman women and one group of Junior women, totalling 167 students, in required courses in Bible in Wilson College.

**PROCEDURE:** Scores on a Multiple-Choice Test on Women of the Bible devised by the author and several students in a College Sunday School class were correlated with number of years attending Sunday School, final grade in course, ACE Psychological Examination score, and Cooperative General Culture Test score. The reliability of the test was also determined by the split-test method.

**CONCLUSIONS:** (1) Sunday School instruction as currently administered does not insure the acquisition of important Biblical facts on the part of many regular attendants; (2) a required one-semester college course in Bible taught by a trained teacher can be much more effective in transmitting knowledge of the Bible than exposure to many years of Bible study in the ordinary Sunday School; (3) the acquisition of Biblical knowledge at the college level appears to be associated with intelligence and general culture rather than with prior Sunday School attendance; (4) curriculum content and differences in relative age, teacher preparation, and motivation are suggested in partial explanation of these findings.

**ACKNOWLEDGMENT:** The writer is indebted to Professor Edmund H. Kase of Wilson College for test administration, data, and advice regarding procedure and interpretation.

### BUSINESS MEETING

5:00-6:00 PM, Monday, Osmond 119

PAUL HORST, President

### DINNER AND PRESIDENTIAL ADDRESS

6:00-8:00 PM, Monday, Nittany Lion Inn

PAUL HORST. *Most Men Are Created Unequal.*

### PERSONALITY APPRAISAL

8:50-9:50 AM, Tuesday, Carnegie 3

LOUIS LONG, Chairman

8:50 AM Techniques for obtaining a constant number of responses in Rorschach protocols. GLEN P. WILSON, JR., *University of Texas.*

Rorschach analysis is made exceedingly complex both statistically and psychologically by the extreme range of possible number of responses. Protocol length is usually considered as a "sign" of certain personality characteristics. The clinical usefulness of such a procedure is not questioned here. However, the common practice of comparing raw scores on Rorschach variables from one record to another con-

tains the implicit assumption of equal test length. Since ordinarily this assumption is at best only approximated, and many times obviously violated, the mathematical and psychological value of a considerable amount of Rorschach "statistics" is open to serious question. The pitfalls of these approaches have been well outlined elsewhere. The purpose of this paper is to examine several other methods for attacking the problem that have been utilized by the speaker and others. In general these might be called techniques for obtaining a constant number of responses, either by alteration of the test procedure or by including for analysis only a certain number of responses from each card. Results are presented from specific experiments which were performed on various groups of protocols collected from 208 college students. The technique used by Foster who administered the Rorschach by asking for a specific number of responses is discussed. Other procedures investigated by the speaker are those which: (1) compute results by considering only the first response to each card creating a constant R of 10; (2) find a minimum number of responses *usually* given by subjects to each of the cards (arbitrarily adjusting these minimums so that a constant R of 30 is obtained) and compute results only on these responses; and (3) consider percentage scores with various corrections designed to overcome objections to their use. The advantages and disadvantages of each method are then considered and possible direction of future research indicated.

9:05 AM The validation of a newly developed attitude-interest questionnaire for the selection of college students. DOUGLAS G. SCHULTZ, *Educational Testing Service.*

**PROBLEM:** To develop and validate a new inventory of certain nonintellectual factors for use in selecting college students.

**SUBJECTS:** 355 members of the Class of 1951 and 346 members of the Class of 1952 at a women's liberal arts college of an eastern state university.

**PROCEDURE:** A questionnaire of 328 items, inquiring into pertinent attitudes, interests, and motivations of entering college freshmen, was administered to the Class of 1951 three weeks *after* their arrival at college. 145 of the same items were reproduced in a second booklet which was administered to the Class of 1952 as a part of the normal *application for admission.*

An index of freshman grade performance relative to scholastic aptitude was developed for each individual in the Class of 1951. Three sets of items differentiating most clearly between the extreme students on this index were selected for inclusion in scoring keys. These keys were adjusted for average differences in the responses of the two classes and then applied to the Class of 1952 questionnaires.

**RESULTS:** In the Class of 1952, the three scores were found to have correlations of 0.12, 0.10, and 0.14, respectively, with the index of freshman grade performance relative to aptitude and 0.10, 0.11, and 0.11 with the Freshman Grade Point Average itself. All three keys had correlations of essentially zero with high school average and with College Board Scholastic Aptitude Test scores. Including the first questionnaire score with the two SAT scores increased the multiple correlation with College Grade Point Average from 0.52 to 0.53; adding it to the battery of SAT scores and high school average increased the multiple correlation from 0.63 to 0.64. Some implications of the rather low validities obtained are discussed.

9:20 AM The objective measurement of temperament: the dot comparison test. ROBERT L. CHAPMAN, *New York University*.

**PROBLEM:** In order to subject the hypothesized relationship between perceptual performance and temperamental endowment to rigorous test, an experiment was designed to include one of the more promising perceptual tasks and several of the better criterion measures. The design of the experiment so orders the data that investigations may be made of these additional problems which are implicit in the main problem: (1) The functional relations among time of response, variability of time of response, correctness of response and difficulty of items; and (2) Estimates of the reliability of the objective scores.

**SUBJECTS:** 125 male adults: 40 graduate students and faculty; 45 businessmen of executive caliber; 40 neighbors who represented the general population.

**PROCEDURE:** The perceptual task was a series of 210 items representing five difficulty levels in which the subject was to judge which of two squares had the more dots; the subject set his own standards of speed and accuracy. Both his time of response and the accuracy of his judgment were recorded. (The items were projected on a screen—pressing one of two keys indicated the subject's answer and stopped a clock reading in hundredths of a second.) His scores were also obtained on four factors from the Thurstone Temperament Schedule and from a paired-comparison list of twelve adjectives descriptive of personality.

**RESULTS:** A hyperbolic function fitted the relation between response time and stimulus difference in the perceptual task. By factoring the several parameters discovered, three functional unities were found in the scores obtained from perceptual performance. These function unities were interpreted by comparison with the criterion items and identified as the qualities of impulsiveness, the energy characteristic, and social effectiveness.

Thus it was demonstrated that temperament is a valuable hypothetical construction and that direct

measures of the hypothetical variables can be made from perceptual performance. (Slides)

9:35 AM Validity of test constructors' judgment of personality inventory items. GABRIELLA ROSENBERGER, HUBERT E. BROGDEN, and WALTER A. KLIEGER, *Personnel Research Section, AGO*.

**PROBLEM:** Will test constructors' judgment provide a basis for (1) a valid key; (2) identification of items having small probability of retention in the final key determined empirically?

**POPULATION:** Approximately 1,700 ROTC students from three different groups of military colleges.

**PROCEDURE:** About half of the pool of personality items was administered to one group and the remainder to another group. Ratings on leadership by associates were obtained in the two populations and used as a criterion to compute the validity of each of the 1,600 items. In addition, items were rated by several test constructors as to probable usefulness. The correlation between test constructors' judgment (average) and empirical validity was obtained. Keys were developed on the basis of experts' judgment and applied to the first group. Subsequently, forced-choice pairs were developed from the entire pool of items and administered to the third group. A final key was developed by item analysis against a composite criterion of associates' and superiors' ratings. On the basis of retention, the percentage of items whose potential usefulness was correctly judged by the test constructors was computed.

**RESULTS:** Correlation coefficients between test constructors' judgment and empirically determined validities were in the high 0.30's. A key based upon experts' judgment correlated only 0.10 with the criterion in the first group.

**CONCLUSIONS:** Although there is appreciable correlation between judged and computed item validities, a usefully valid key cannot be constructed solely on basis of experts' judgment.

Work is planned to determine whether the elimination of items judged inadequate by test constructors will appreciably affect the validity of a key resulting from item analysis.

## TEST VALIDATION

10:00-11:00 AM, Tuesday, Carnegie 3

CHARLES I. MOSIER, Chairman

10:00 AM Validity of the law school admission test for predicting first-year law school grades. MARJORIE A. OLSEN, *Educational Testing Service*.

**PROBLEM:** To determine the effectiveness of the Law School Admission Test (LSAT) and of pre-law col-

lege grades for predicting first-year success in law school.

**SUBJECTS:** 2905 students in the law schools of 18 universities, who entered in the fall of 1948. This survey approached a complete coverage of the law schools using the test in 1948.

**PROCEDURE:** For each school, correlations were obtained between first-year average grades and LSAT scores. In twelve schools, it was also possible to study the validity of pre-law average grades and obtain multiple correlations for the two predictors. Average correlations were then determined by means of Fisher's Z-transformation. Estimates were made of the effect of restriction of range on the validity coefficients for LSAT, assuming univariate selection and a standard deviation of 100 for the applicant group.

**RESULTS:** In the twelve schools where both predictors were available, the combination of LSAT scores with a measure of success in pre-law college work typically proved to be substantially more effective than either predictor used alone. For these schools (including a total of 1725 students) the best estimate of the validity (not adjusted for selection) of the pre-law grades was 0.38; of the LSAT, 0.40; and of the combination of the test with pre-law grades, 0.52. In ten of the twelve schools, the test scores equalled or excelled the college average as a predictor of first-year law grades. When adjusted for restriction of range, the average validity of the LSAT was 0.51 for these schools. Results based on all students in the study were in substantial agreement with those for the twelve schools. In interpreting these results, it should be noted that aptitude rather than achievement was stressed in designing this test. (Slides)

10:15 AM Minnesota Psycho-Analogies Test. ABRAHAM S. LEVINE, *Lackland Air Force Base.*

**PROBLEM:** To develop a special analogies test as an aid in selection and evaluation of psychology students.

**SUBJECTS:** Students in various psychology courses, graduating seniors and graduate students with a major in psychology.

**PROCEDURE:** Test passed through two earlier editions. First edition of 100 items was designed primarily to investigate effectiveness of a special analogies test as a predictor of course achievement in psychology. Second edition, consisting of a total of 232 items, served as a pool from which items were selected for final edition. Items were selected on the basis of internal consistency, subject-matter representativeness, and difficulty-level, for inclusion in the final edition, which consists of two equivalent forms of 75 items each.

**RESULTS AND CONCLUSIONS:** The first edition of the test correlated 0.60 with combined midquarter and final examination scores for 92 students in a class in

Vocational and Occupational Psychology at the University of Minnesota. Correlations of a single form (116 items) of the second edition of the test ranged from 0.51 to 0.74 for various psychology courses at the same university. Available data on these earlier editions indicated that the test was a better predictor of course achievement than either Miller Analogies (Form A or B), or a specially designed achievement pre-test. A tendency was noted for correlations between Psycho-Analogies and course examination scores to be higher at the more advanced levels. Final edition of the test succeeded in significantly differentiating various levels of undergraduate and graduate majors in psychology.

10:30 AM Item selection and keying for a practical judgment test. JOHN W. FRENCH, *Educational Testing Service.*

**PROBLEM:** Practical Judgment items as discussed here consist of a stem that sets a problem followed by a set of solutions, the best one of which is to be selected by the testee. Success on these items depends on interpretation of common sense information or on the selection of a course of action that is most likely to succeed in situations where not all of the pertinent facts are known. For many items it cannot be said that one response is correct while another is not. Therefore, it is difficult for the test constructor not only to select the most valid items, but also to key the items in a way that will best serve the purpose of the test.

**SUBJECTS:** First-year law students, 106 at one school, 180 at another.

**PROCEDURE:** The subjects were available for one hour of testing time. Forty items were used, sufficiently few to permit all subjects to finish. The items were keyed by the persons constructing them. Biserial correlations were obtained for each item using as criterion (1) the total Practical Judgment test score, (2) a verbal test score, and (3) law school grades. The item analysis results for grades at one school were used to alter the test key so that the responses yielding the highest biserials would be scored as correct. The poor items were then eliminated using a graphical method suggested by Harold Gulliksen, which served to retain items combining a maximum biserial with grades and a minimum biserial with the verbal test, since verbal aptitude will be well represented in any law school entrance battery.

**RESULTS:** The selection of items and alterations in keying based on the biserials with the verbal test and the grades at one school are shown to increase the validity of the test for prediction of grades at the other school. Increased validity is measured in terms of the increase in the multiple correlation using verbal and practical judgment.

10:45 AM The difficulty and validity of analogies items in relation to major field of study. JEROME E. DOFFELT, *The Psychological Corporation*.

**PROBLEM:** The use of a verbal intelligence test constructed primarily for college seniors and graduate students raises the question of the effects on the test items of the interaction between item content and the students' major field of training. Although in the analogy-type item the relationships between the parts of the analogy are stressed, the content of the item may nevertheless be an important variable. This paper reports a study of the relationships between the analogies items in a high-level intelligence test and the major fields of the subjects.

**SUBJECTS:** The subjects include over 5000 college seniors and graduate students tested in different parts of the country with the Miller Analogies Test.

**PROCEDURE:** The students were classified on the basis of major field into three groups: science, non-science and psychology majors. The test questions were similarly classified on the basis of content. Since the number of items classified as psychological was small, only the other two categories were used. Difficulty and discrimination indices were computed for each item for the three curricular groups. Comparisons were made among the major field groups with respect to the science and non-science item indices.

**RESULTS:** In general, science students found both science and non-science items easier than did the non-science students. The psychology students were superior to both of the other groups in average test score. Item-test coefficients were not very different for curricular groups for either science or non-science items, with slightly better discrimination among non-science students. The discrimination indices of analogies items are relatively independent of the major fields of the students when highly specialized material is avoided.

## TEST STANDARDIZATION

11:10-11:55 AM, Tuesday, Carnegie 3

JOHN C. FLANAGAN, Chairman

11:10 AM Standardization of the Armed Forces Qualification Test AFQT-1 and 2. HYMAN BRANDT and LAVERNE K. BURKE, *Personnel Research Section, AGO*.

**PROBLEM:** To standardize the Armed Forces Qualification Test on a current military population selected to reflect the distribution of scores among potential recruits and draftees in a fully mobilized population.  
**SUBJECTS:** 2704 Army, 2087 Navy and 2145 Air Force recruits were tested at training divisions during July 1949.

**PROCEDURE:** Major consideration was given to the use of stratified sampling employing a number of variables versus "tie-back" to previous general classification test score distributions. Solution involved utilization of all classification scores available in all branches of the services as of 31 December 1944. Scores for the Navy and Coast Guard were converted to the system used by the Army, Air Force and Marine Corps. Correction was also made for the officer personnel who were not tested at that time. The resulting distribution of scores for the 12 million in the five services combined was used as the basis for selecting from those tested two populations of 2,000 cases each from the present enlistees in the Army, Air Force and Navy. The Army General Classification Test in use in 1944 was the reference test employed in alternation with AFQT in the standardization run. In addition, 600 Army recruits were given both forms for comparative purposes only.

**RESULTS:** A single conversion table of percentile equivalents was developed since differences in order of administration and between the two forms were negligible. The percentile distribution is such that there is no discrepancy from the theoretical, normal curve above the mean and very little below until the point - 1½ sigma is reached. The comparison study yielded a correlation of 0.93 between the two forms with a mean difference of two raw score points. There was only a practice gain of two raw score points on either form.

11:25 AM The relationship of measured reading skills to mental abilities as measured by paper-and-pencil tests. FRANCES TRIGGS, *University of Maryland*, and MEMBERS OF COMMITTEE ON DIAGNOSTIC READING TESTS, INC.

**PROBLEM:** What reading tests measure, and the extent to which they must be interpreted with reference to scores on tests of mental ability to draw valid conclusions concerning prognosis for remedial work is not a new problem for research but one on which continuing work must be done. This paper reports research of this nature. Furthermore, the data are interpreted in terms of evaluative patterns for corrective and remedial reading programs in order that new approaches to the evaluation of corrective programs may be stimulated. Tests measuring the following reading skills have been studied: vocabulary, textbook comprehension, word recognition skills, rates of reading, and performance and linguistic abilities as measured by five paper-and-pencil tests which segregate these factors.

**SUBJECTS:** Upper grade and college freshman level from twenty institutions.

**PROCEDURE:** Correlations, bi-serial, and "t" tests are the statistical procedures employed.

**RESULTS AND CONCLUSIONS:** Briefly conclusions and applications which can be made from data presented in this paper are as follows: tests which break down the mental abilities are much more valuable for predicting techniques to be used and success in corrective work than are those which measure an omnibus "general ability." Paper-and-pencil tests of performance and verbal factors do not have close agreement with individual tests and there is some indication that the latter give greater latitude for prognosis in corrective reading. Many by-products are also noticeable: the relationship between ability measured by paper-and-pencil tests and word recognition skills is not as close as is the relationship between ability and the more general reading skills such as vocabulary and comprehension. Conclusions suggest that patterns of evaluation of corrective programs be changed to include mental abilities as a first criterion for planning and evaluating them.

11:40 AM The relation of age within grade to achievement in elementary school subjects. ROGER T. LENNON, *World Book Company*.

**PROBLEM:** The interpretation of grade equivalents derived from elementary achievement tests suffers from the fact that usually these grade equivalents do not take into account differences in chronological age among pupils or classes in a given grade, arising from such causes as differences at age of entrance and differences in promotion policies. Study of the relation of these differences in chronological age to achievement is complicated by the inverse relation between age and intelligence within a grade. This study presents data on the relation between chronological age and achievement in the various subjects, in successive grades, when differences in IQ are controlled.

**SUBJECTS:** The study is based on analysis of the scores of a random sample of pupils in grades 2 through 8 in the national standardization population for the *Metropolitan Achievement Tests*, including approximately 8,000 cases at each grade.

**PROCEDURE:** At each grade level four successive CA groups were selected, each including pupils within a six-month CA interval (*e.g.* at grade 3, the groups were 7-5-7-10; 7-11-8-4; 8-5-8-10; 8-11-9-4). The two middle six-month groups in each grade comprised the "modal-age" group in that grade. The four groups within each grade were equated on IQ. Next, mean achievement test scores were calculated by grade for each of the four matched groups on the following Metropolitan Achievement Tests: Reading, Vocabulary, Arithmetic Fundamentals, Arithmetic Problems, English, and Spelling.

Thus there were available at each grade level for each of the six subjects mean scores for four suc-

cessive age groups, differing by successive steps of approximately six months, but matched on IQ. These differences in mean scores are considered to be measures of the contribution of greater mental maturity and life experience to achievement in the various subjects.

**RESULTS:** Results indicated that within each grade there are differences in achievement positively associated with differences in chronological age when the factor of intelligence is controlled. These differences tend to increase as one goes up through the grades and tend to be relatively greater for those subjects most closely correlated with intelligence—Reading, Vocabulary, and Arithmetic Problems—and relatively less for the skill subjects—Arithmetic Fundamentals, English and Spelling. Limitations and reservations in the interpretation of the data are pointed out, and suggestions for their application in connection with grade equivalents are given.

## STATISTICAL CONSIDERATIONS

1:40-2:40 PM, Tuesday, Carnegie 3

HAROLD GULLIKSEN, Chairman

(Co-sponsored with Psychometric Society)

1:40 PM Simplified computation of the tetrachoric correlation coefficient and its standard error. STEPHEN C. CLARK and JOHN E. FREUND, *Alfred University*.

**PROBLEM:** Various formulae and graphic methods have been suggested for simplifying the computation of the tetrachoric coefficient of correlation,  $r_t$ . Generally these resolve themselves into the familiar

$$r_t = \cos(\pi U) \quad (1)$$

where

$$U = \frac{a+d}{N} \quad (2)$$

if the dichotomies are at the medians; otherwise

$$U = \frac{\sqrt{ad}}{\sqrt{ad} + \sqrt{bc}} \quad (3)$$

For the standard error the usual formula is

$$SE_{r_t} = \frac{\sqrt{pp'qq'}}{yy'\sqrt{N}} \quad (4)$$

assuming  $r_t = 0$ .

Can these formulae be further simplified without sacrificing further accuracy?

**DERIVATION:** If formula (1) is expressed as a Maclaurin series, using only the first term, and approximating  $\pi$  as 3, then

$$r_t = 1.50 - 3U. \quad (5)$$

It follows, by the same assumption as in formula (4)

that  $r_t = 0$ , that

$$SE_{r_t} = \frac{1.50}{N} \quad (6)$$

**LIMITATIONS:** 1. So long as  $U$  is between 0.31 and 0.50 (equivalent to  $r$ 's from 0.00 to 0.57) formula (5) gives values within 0.010 of formula (1)—averaging 0.006 difference. 2. The standard error by formula (6) is nearly always larger than by formula (4), usually by about 20%. 3. All of the assumptions made for tetrachoric correlation are needed here as well: rectilinear regression, normal distribution of both variables, and continuous distribution of both variables.

**USES:** 1. Gives a quick, rough approximation—almost by inspection. 2. Indicates if it is worthwhile to compute  $r$  by some longer method. 3. Serves as a check on computations. 4. Can be used as a teaching device to help students visualize what  $r$  means.

**ADVANTAGES:** 1. No trigonometric functions involved, hence no tables. 2. No proportions to calculate. 3. Readily adaptable for slide rule use. (Slides)

1:55 PM By-products of short-cut sigma. WILLIAM LEROY JENKINS, *Lehigh University*.

It was reported at the 1950 EPA meetings that a short-cut sigma based on approximately 25% tails of a sample from a normally-distributed population has a smaller standard error than when the entire sample is used. This finding suggests that a triserial  $r$ , based on approximately 25% tails, should have a smaller standard error than a biserial  $r$  based on the entire sample. Preliminary empirical study of 60 samples of fifty and one hundred cases bears out this hypothesis.

Triserial  $r$  is intrinsically useful, because it makes possible handling ratings in three categories (such as superior, mediocre, inferior) which are sometimes more natural and meaningful than two-category ratings (such as above average, below average). Also if four or more categories are employed, computing a single triserial  $r$  from approximately 25% tails gives as low a standard error as averaging all the possible biserial  $r$ 's.

The same principle of utilizing 25% tails is now being extended to manifold tables. In a  $4 \times 2$  table, for example, preliminary studies indicate that a lower standard error is obtained from averaging two tetrachorics based on approximately 25%-75% divisions than by computing a single tetrachoric based on a 50%-50% division.

2:10 PM Correcting item-analysis data for chance success. FREDERICK B. DAVIS, *Hunter College*.

**PROBLEM:** When item-analysis data are computed for multiple-choice test exercises, two opportunities exist to correct for chance success. Whether to do so at

either or both of these opportunities is a disputed issue.

**PROCEDURE:** The theoretical and practical considerations that should be taken into account to obtain the most meaningful item-analysis data are presented. Empirical data that confirm the results of the logical analysis are cited.

**CONCLUSIONS:** (1) Groups of items given for item-analysis purposes should, ideally, be administered with sufficient time to permit every examinee to consider every item. In practice, this ideal should be approached as closely as possible. (2) Directions to examinees should encourage shrewd guessing and should discourage wild guessing by mentioning a penalty associated with it. They should rarely, if ever, require an examinee to mark an answer to every item. (3) Examinees' scores on the entire group of items should be corrected for chance success when these scores are to constitute the criterion for item-analysis purposes. When this is done, the discrimination and difficulty indices for individual items will be more meaningful even if they are not computed with a correction for chance success. (4) Regardless of whether examinees' scores on the entire group of items have been corrected for chance success, it is desirable to correct for chance when computing the discrimination and difficulty indices for individual items in order to make them maximally useful for item revision and test assembly.

2:25 PM Can personnel researchers test and train themselves in statistics? DONALD E. BAIER, HARRY H. HARMAN, and HAROLD L. MCADOO, *Personnel Research Section, AGO*.

**PROBLEM:** The purpose of this study was to determine the areas of relative strength and weakness in statistical concepts and techniques among a group of personnel psychologists.

**SUBJECTS:** The professional staff of the Personnel Research Section, AGO, Department of the Army—approximately 60 men and women, under 45 years of age, with academic training ranging from B.A. through Ph.D., and experience varying from the first year on a full-time job in personnel research to some 20 years in related work. This staff is engaged in research aimed at improving techniques of personnel selection, classification, placement, and evaluation.

**PROCEDURE:** A diagnostic test was constructed by a group of "experts," based upon the statistical needs of psychologists actively engaged in personnel research. These needs were ascertained by interviewing the staff concerning statistical concepts used in such research. The test was designed to yield an assessment of the individual's functional knowledge of these concepts; therefore, a subtest score was obtained for each area separately. On the basis of test

results, an in-service training course is being tailor-made to fit the training needs of the staff.

**RESULTS:** In view of the diversity of years of formal training, including courses in statistics, interval of time since last training, and experience, a wide range of scores was expected and obtained. Conclusions are drawn as to the usefulness of the test for aiding in the proper training of personnel researchers. In addition to the diagnostic value of the test, it was deemed of interest to investigate, for the specialized group, the relationships between this test and measures of training, experience, salary level and responsibility, and rated effectiveness in personnel research activities.

### TEST PARAMETERS

2:50-3:50 PM, Tuesday, Carnegie 3

IRVING LORGE, Chairman

(Co-sponsored with Psychometric Society)

2:50 PM Some effects of shortened time limits on a battery of power tests. ALEXANDER G. WESMAN, *Psychological Corporation*.

**PROBLEM:** When a battery of power tests is administered to a higher level population than that for which it was devised, what will be the effects of shortening the time limits on (a) the range of scores, (2) intercorrelations of the tests, (c) predictive power of the tests?

**SUBJECTS USED:** 690 male and 160 female freshmen at a midwestern university; 362 male freshmen at an eastern engineering school.

**PROCEDURE:** The Differential Aptitude Tests were administered to the above populations. The seven tests which are primarily power tests were given with shortened time limits. The eighth test (Clerical), which is a speed test, was used with its regular time limits. Score distributions were made for each group separately. Intercorrelation tables were also prepared, and validity coefficients were computed against end-of-term grades at the first-named institution. (Additional criterion data for end-of-year grades at both institutions are expected and will be analyzed.) Data previously reported by Berdie (APA 1949) as to results under normal time limits, and data available in the DAT manual, formed the basis for comparison of the results from normal and shortened time limits.

**RESULTS:** (a) The shortened time limits produce a great spread of scores with these college populations. (b) No important or systematic changes resulted in the intercorrelation matrices as a result of the shortened time limits. (c) Validity coefficients do not appear to suffer as a result of shortened time limits when these tests are used with college students.

3:05 PM Item parameters which are invariant with respect to group ability level. HAROLD GULLIKSEN, *Educational Testing Service and Princeton University*.

**PROBLEM:** To devise indexes of item difficulty and item validity that do not vary systematically with changes in the ability distribution of the group tested. Most such indexes vary systematically with the ability level of the group. For example "per cent of persons answering an item correctly" will change with the mean ability of the group, while the "item-criterion correlation" will change with the variance. Item parameters which remained relatively invariant with respect to such changes in the group tested would be valuable.

**PROCEDURE:** In developing the theory, three types of variables are assumed:

- (1)  $X$ , an independent variable which is made the basis for explicit selection of the test group,
- (2)  $Z_g$  ( $g = 1, 2, \dots, K$ , for a  $K$ -item test), the ability which is utilized in answering item  $g$ .
- (3)  $Y$ , the criterion variable.

The  $K + 1$  variables ( $Z_g$  and  $Y$ ) are dependent variables such that any selection on them is incidental selection due solely to their correlation with  $X$ .

Item difficulty and validity parameters are derived utilizing the assumptions that explicit selection on  $X$  will not alter:

- (a) the slopes of the regressions of  $Y$  on  $X$  and of  $Z_g$  on  $X$ ;
- (b) the variance about these regression lines; or
- (c) the partial correlations between  $Z_g$  and  $Y$  ( $X$  partialled out).

**RESULTS:** Final formulas will be given and the method of derivation and basic assumptions will be indicated. The value of such parameters will be discussed, as well as the possible extension of the method to include the case in which the criterion is total score on the test of which the item is a part.

3:20 PM The comparative composite validities of "short" versus "long" tests. JOHN T. DAILEY and LELAND D. BROKAW, *Directorate for Personnel Research, Human Resources Research Center, Lackland Air Force Base*.

Comprehensive coverage of factorial areas deemed necessary for proper classification of Air Force technical training enlistees would require a considerable number of tests. If previous standards of test reliability were to be met required testing time would be arduously long. Fatigue engendered by a testing period of more than two days might destroy the motivation of examinees. An additional point against the use of such a long testing period was the number of man hours consumed in testing and test processing.

In an effort to reduce required testing time concepts of test reliability and test validity as affected by test length were examined. As test length is altered the change in magnitude of reliability is greater than the change in validity. It was assumed that individual tests in a battery might be significantly shortened with little effect on the composite battery validity. Unique tests might be inserted in time so made available permitting more complete factorial coverage with no increase in testing time over the original battery.

For experimental proof of this hypothesis 223 aircraft and engine (Jet) mechanics were chosen and a comparison made of the composite validities of six power tests from the airman classification battery in their full-length and synthesized half-length forms.

For this sample there was a very small loss in battery validity from reduction to half-length. There was a slight loss in battery reliability. The multiple correlation between the six full-length tests and the final course grade in the mechanics school was 0.57; for the half-length tests the correlation was 0.56. The full length battery reliability was 0.95; the half-length reliability was 0.90.

The desirability of shortening tests of the airman classification battery and introduction of unique tests in the time so made available was confirmed.

3:35 PM A method of estimating the distribution of test scores from coefficients of item difficulty.

CLAUDE F. BRIDGES, *World Book Company*.

PROBLEM: Often it is desirable to estimate the percentiles, mean, standard deviation, or other statistics for the final form of a test before its actual use. This paper presents a method whereby these statistics can be estimated from coefficients of item difficulty contained in item analyses based on the upper 27% and lower 27% (or another percentage) of the experimental population.

CHARACTERISTICS OF THE METHOD: 1. The method is simple and uses commonly available data. 2. The method is applicable when the final form contains items from several experimental forms, if the item analysis of these forms was based on equivalent populations. 3. The estimated distribution applies to the population which took the experimental form.

DATA: The item analysis data secured from the administration of the Shaycoft Plane Geometry Test (Experimental Form 3) to 736 high school geometry students were used. Estimates were obtained for statistics based on a hypothetical final form consisting of 64 items selected from the 110 items in the experimental form.

PROCEDURE: The method was applied to the data described above and the results checked empirically by rescoring the papers on the "final form" to determine

the actual distribution. The resulting data will be presented; the application and limitations of the method will be discussed.

APPLICATIONS: When the item analysis is based on a fairly representative group, this technique can be used to provide tentative norms for those cooperating in standardizing new tests, to scale civil service examinations, etc.

## CRITERIA ANALYSIS

4:00-5:00 PM, Tuesday, Carnegie 3

ROBERT THORNDIKE, Chairman

(Co-sponsored with Psychometric Society)

4:00 PM Research on the development of a criterion of effectiveness for scientific personnel. MARY H. WEISLOGEL, *American Institute for Research*.

PROBLEM: To conduct a field test of a procedure for evaluating the effectiveness of scientific personnel. This procedure was designed to provide a criterion of effectiveness for validating selection instruments and evaluating personnel.

SUBJECTS: A representative sample of approximately 200 senior professional workers in government research and engineering laboratories.

PROCEDURE: The evaluation form contained a classified list of empirically derived behaviors considered critical by senior scientific personnel. The subjects were given training in the use of the procedure, and then used the procedure for four weeks in observing and recording the critical behaviors of their immediate subordinates. The following three variables were selected as particularly important to the procedure, and each was systematically varied throughout the field test: (1) a long versus a short form of the observational record, half of all participants using each form; (2) comprehensive versus abbreviated training in the use of the procedure; comprehensive training consisted of one session, three hours in length, including general orientation and practice in recognizing, classifying, and recording critical behaviors; abbreviated training consisted of a one-hour session similar to the longer session, with more limited practice. Half of all participants received comprehensive and half abbreviated training; and (3) recording of observations daily, weekly, or monthly. One-third of all participants were assigned to each group. All participants submitted a comment sheet containing their evaluations of the procedure.

RESULTS: The specific data collected for comparing the procedures include: (1) results of the practice exercises performed during the training sessions; (2) the numbers of observations recorded during the tryout period, (3) the frequency of use of specific classification categories and (4) the comments sub-

mitted by participants. The data provide a basis for selecting the combination of procedures suited for obtaining criterion measures on scientific personnel in specific working situations.

4:15 PM An analysis of criterion data. DAVID G.

RYANS, *University of California at Los Angeles.*

**PROBLEM:** Three questions relating to the *criterion* must be considered in any psychological research concerned with problems of prediction: (1) What specific behavior data contribute to the criterion? (2) How (by what method) shall the criterion data be obtained? (3) How are the criterion data structured or patterned? Question 1 has to do with job analysis, Question 2 with the validity, reliability, and practicability of methods of obtaining criterion data, and Question 3 with the major dimensions of the criterion.

The present study deals with the third question (the uni- or multi-dimensional nature of the criterion) as it relates to data based on assessments of teaching effectiveness made by trained observers using a specially devised Observation Blank. Specifically an answer to the following question is sought: Should analyses of the discrimination ability of secondary criterion data, or predictors, be undertaken with regard to a single overall criterion, or should such analysis proceed on the hypothesis that the criterion consists of several dimensions?

**SUBJECTS:** All third and fourth grade teachers in four communities, of from 50,000 to 100,000 population, were observed.

**PROCEDURE:** Each teacher was independently observed on a number of different occasions by the several trained observers. Immediately following an observation the teacher was assessed by the observer with regard to each of a number of characteristics.

The observation data of the several observers were combined to provide composite assessments for each teacher on each characteristic represented on the Observation Blank. Measures of association were computed between each characteristic and every other characteristic. The resulting table of intercorrelations was subjected to factor analysis.

**RESULTS:** The observations appeared to be sufficiently reliable and valid for use of the criterion data obtained. Factor analysis of the criterion data suggested that the observed teaching behavior might best be described by a limited number of relatively independent dimensions.

4:30 PM Some aspects of the problem of differential prediction. WILLIAM G. MOLLENKOPF, *Educational Testing Service.*

Whenever a choice must be made among several courses of action, as in the choice of appropriate

study programs in high school and college, the problem is one involving the making of differential predictions. In the simplest case the choice is limited to two alternative courses of action, *a* and *b*, and it is desired to predict for a given individual *i* whether his likelihood of success is better in *a* than in *b*.

Let us suppose that a battery of *K* tests is given to all *N* individuals under consideration, and that for each individual there become available measures in two criteria, *a* and *b*. If each test in the battery is then assigned its multiple regression weight for predicting each criterion, it can then be shown that (1) the multiple regression weight to be applied to the standard score for each test to predict the criterion-difference score is equal to the difference between the weights for predicting each criterion separately, (2) the difference between the predicted scores for the two criteria is the same as the predicted difference in criterion scores, and (3) the square of the multiple correlation between predicted and actual criterion-difference scores is equal to the sum of the squares of the multiple correlations of the battery with each criterion, less the product of these correlations and the correlation between predicted scores, all divided by twice the quantity one minus the criterion inter-correlation.

From these results, especially (3), certain points regarding the characteristics desirable in a differential predictor become evident. These will be described and illustrative examples will be given.

4:45 PM Rationales: a procedure for developing valid tests. JOHN C. FLANAGAN, *American Institute for Research.*

**PROBLEM:** Procedures for the development of tests have been undergoing a change in recent years. For a long time the test making process consisted of (1) deciding to measure a particular trait; (2) writing items which seemed likely to measure it; and (3) publishing it as a measure of the trait in question either with or without some correlational data on its agreement with or ability to predict other variables. Two related factors have been changing this situation. First, the test constructors are getting to know more about what items of a given type and content can be expected to measure and second, more attention is being paid to more detailed definitions of what is to be measured or predicted.

**TECHNIQUE:** To supply the need for a more precise statement of just what a test is intended to measure and to make explicit the hypotheses which underlie the items which have been constructed to perform this function, the technique of preparing *rationales* has been developed. Within the past year *rationales* have been developed for four tests: a selection test for research personnel, a proficiency test for research

personnel, an attitude test for applicants for factory work, and a battery of tests covering the proficiencies found to be critical for aircrew members. The *rationales* for each of these tests have consisted of specific item-rationales. Each item-rationale is usually about one or two pages in length. It consists of (1) a definition of the specific practical behavior, (2) a discussion of the psychological functions involved, and (3) detailed specifications for writing an item. **CONCLUSIONS:** These detailed rationales make possible systematic evaluations of the logical or intrinsic validity of test items in complex tests.

#### **FACTOR ANALYSIS: PROBLEMS AND RESULTS**

8:50-9:50 AM, Wednesday, Little Theatre

(Co-sponsored with Psychometric Society. See Psychometric Society's program.)

#### **SYMPOSIUM: THE NEED AND MEANS OF CROSS VALIDATION**

10:10 AM-12:10 PM, Wednesday, Little Theatre

(Co-sponsored with Psychometric Society. See Psychometric Society's program.)

#### **CORRELATION: METHODS, RESULTS AND INTERPRETATIONS**

1:40-2:40 PM, Wednesday, Little Theatre

(Co-sponsored with Psychometric Society. See Psychometric Society's program.)

#### **SYMPOSIUM: PROBLEMS IN DIFFERENTIAL CLASSIFICATION**

2:50-5:00 PM, Wednesday, Little Theatre

(Co-sponsored with Psychometric Society. See Psychometric Society's program.)

#### **METHODOLOGICAL PROBLEMS**

8:50-9:50 AM, Thursday, Little Theatre

(Co-sponsored with Psychometric Society. See Psychometric Society's program.)

#### **SYMPOSIUM: THE DISCRIMINANT FUNCTION IN PSYCHOLOGICAL RESEARCH**

10:00 AM-12:10 PM, Thursday, Little Theatre

(Co-sponsored with Psychometric Society. See Psychometric Society's program.)

### **DIVISION ON CHILDHOOD AND ADOLESCENCE**

#### **DEVELOPMENTAL TRENDS IN SCHOOL-AGE CHILDREN**

8:50-9:50 AM, Wednesday, Sparks 10

(Co-sponsored with Division 15)

VICTOR H. NOLL, Chairman

8:50 AM The developmental trends of abstraction ability in young elementary school children. IRVING SIGEL, *Smith College*.

**PROBLEM:** To determine the developmental trends in abstraction ability among elementary school children (ages 7, 9, and 11) as measured by performance on tasks requiring grouping of realistic toy objects, and symbolic representations of these objects, *i.e.* pictures and words. To determine quantitative and qualitative differences among the three groups in terms of approach to the tasks, bases of the groupings, numbers of groupings made, and extensiveness of the groupings.

**SUBJECTS:** Sixty children, 20 in each age group, were selected from the public schools of East Chicago, Indiana. Each child was matched in regard to social

class, sex, color and intelligence level. Each child was in the proper grade for his age.

**PROCEDURE:** Five tests composed of toy objects, and pictures and word names of these objects were used. Each of these tests was presented individually to each child. The task for the subject was to group the items in each test on the basis of belongingness. After the first trial, the task was to group the items in fewer groupings. The tests were presented at the rate of one per day. Precautions were taken to reduce practice and perseveration effects. The groupings of the subjects were scored and quantified according to categories derived from the work of Goldstein, Bolles and Werner. These categories are as follows: (1) perceptual, with sub-categories of affective, identity, partial identity, centroid, and functional; (2) conceptual; (3) miscellaneous, with sub-categories of thematic, pseudo, and mixed categories of perceptual-conceptual, and perceptual-perceptual.

**RESULTS:** Results demonstrate similarities and differences between the age groups studied in approach to each test, in stability of this approach, and the developmental trend.

9:05 AM Impact of first-grade entrance upon the socialization of the child. CELIA BURNS STENDER and NORMAN YOUNG, *University of Illinois*. (Abstract exceeded 300-word limit.)

9:20 AM A comparison of school and non-school child behavior in terms of behavior settings. JACK NALL and PHIL SCHOGGEN, *University of Kansas*.

**PROBLEM:** Child behavior settings are the relatively stable loci for children's behavior which are generally perceived as being appropriate as centers for particular kinds of behavior. A behavior setting is denoted both by (1) its distinguishable objective physical-social characteristics; and (2) its generally perceived behavior possibilities for children. Some examples are "drug store," "4-H club meeting," "elementary school" and "vacant lot."

A complete inventory of the behavior settings for the children of Midwest, U. S. A., together with an indication of their relative importance, serves as a guide for sampling the vast amount of children's behavior which occurs daily.

To exemplify the use of behavior settings in naturalistic studies of children's behavior, a detailed comparison is made between the behavior and psychological situations occurring in the "school-classroom" behavior setting and those occurring in behavior settings which are independent of the school.

**PROCEDURE:** The data used in this comparison are taken from a day-long record of the behavior and situations of a seven-year-old boy. This record is a minute-by-minute narrative account recorded in concrete detail. Nine skilled observers alternated in 30-minute intervals through the 13½ hours of his waking day.

The record was divided into the naturally occurring behavior units or episodes. Each episode was characterized according to more than 100 behavior and situation variables. In accordance with these variables, the episodes of behavior which occurred in the "school-classroom" behavior setting were compared with those which occurred in settings which are not school related.

**RESULTS:** A formulation was developed for determining the relative importance of behavior settings for children. This formulation was applied to the "school-classroom" setting.

9:35 AM The prediction of teacher-pupil interaction with a projective test. THERON ALEXANDER, *Florida State University*.

**PROBLEM:** To predict with a projective test certain ways in which teachers interact with children.

**SUBJECTS:** The projective test was administered to 70 teachers in two groups of approximately 35 each. A

sample of 25 subjects for this study was selected from the larger group of 70 on the basis of age and marital status. The mean age for this sub-group was forty. The data were gathered in connection with a research project at the University of Chicago.

**PROCEDURE:** A projective test similar to Murray's TAT and consisting of eight pictures selected as the result of a pilot study was used. The data obtained from the responses to the stimuli were analyzed according to a framework, and a procedure for analysis was developed during the course of the research. Predictions were made "blind" from the analyses and compared with observational data.

**RESULTS:** It was found that for all of the seven categories of behavior 76 per cent of the predictions were in agreement with the observational data. Only 38 per cent of the predictions would be expected by chance to agree with the observational findings.

**CONCLUSIONS:** This study has shown that it is possible to predict certain ways of behavior of teachers and that these predictions have close agreement with the observed behavior in the classroom. Also, in view of the wide range of information provided by the analysis of the TAT in areas of mental capacity, emotional make-up, and patterns of adjustment, it is worthwhile to consider the possibilities for the use of the TAT in the selection of teachers. (Slides)

## CHILD DEVELOPMENT I

10:00-11:00 AM, Wednesday, Sparks 10

IRVIN L. CHILD, Chairman

10:00 AM The effect of three feeding variables on the non-nutritive sucking of newborn infants. ARTHUR J. BRODBECK, *University of Illinois*.

**PROBLEM AND PROCEDURE:** Thirty-six newborn experimental infants were fed by bottle during the first four days of life and changed to cup for the next four days. They were divided into four different groups of 9 each, on the basis of the conditions under which they were bottle fed. The first two groups were made to exert strong and weak pressure of sucking during feeding by controlling size of nipple holes, but received equal, moderate amounts of milk per feeding. The second two groups were given, relative to each other, large and small amounts of milk per feeding under equal conditions of moderate sucking pressure. The 16 control infants were bottle fed for the entire eight days under routine (uncontrolled) hospital conditions. Finger tests, measuring sucking responsiveness, were given immediately after, exactly between, and immediately before each four-hour feeding, and these measures were related to the conditions of bottle feeding and the change of feeding methods.

**MAJOR RESULTS:** The babies who had to exert strong pressure showed a significant rise of sucking responsiveness with continued bottle feeding, but the weak pressure group did not. However, the weak pressure group did significantly more sucking *after feeding* than the strong pressure group, but at no other between-feeding time. The babies who received more reward showed more sucking responsiveness at all points between feedings, although *both* groups increased their responsiveness scores with continued opportunity to bottle feed. All four groups showed significant decreases in non-nutritive sucking during the second four-day period (when changed to cup), while the control group did not.

**CONCLUSIONS:** These results are interpreted in terms of a learning theory. There appears to be no need to use an "oral drive" concept to explain these particular data.

10:15 AM Socio-economic status and race as factors in infant intelligence test scores. A. R. GILILAND, MARY MCBATH, and JEANNE PFAFF, *Northwestern University*.

This study compares (1) the effects of the socio-economic status of the parents on the intelligence test scores of their infant children; and (2) the scores of these white infants with Negro infants.

In part (1) 533 white infants were given the Northwestern Infant Scale, Form A (4-12 wks.), Form B (13-36 wks.), or the Cattell Infant Scale. The infants' parents were rated on a six point socio-economic scale on which one represented the professions and six, unskilled labor.

The infants were divided into two groups upon the basis of midparent socio-economic status. The mean score for the 287 whose ratings were in the upper half of the scale was 101 and for the 246 in the lower half it was 100.5. Similarly small differences were obtained when (a) only the extreme cases were compared, (b) infants reared in their own homes and in institutions were compared, and (c) both younger and older groups were compared. Under all these conditions socio-economic status showed no significant influence on scores.

In part (2), 113 Negro infants were compared with the white infants of part (1). These Negro infants were selected as a representative sample from Evanston and the North Shore. Their mean I.Q. was 102. There was no significant difference between Negroes and whites.

Later in life, socio-economic status and, possibly, race influence intelligence test scores. But before 36 weeks our results indicate these factors have not begun to cause differences.

10:30 AM Dependency and independence in young children. E. K. BELLER, *Indiana University*.

**PROBLEM:** Five components of dependency are defined in the present study, i.e. striving for help, attention, approval, physical proximity, and physical contact. Similarly, five components of independence are defined, i.e. striving to overcome obstacles, to initiate own activities, to complete activities, to perform routine tasks, and to gain satisfaction from work.

**SUBJECTS:** Twenty-two three-year-old and 22 four-year-old boys and girls from a nursery school.

**PROCEDURE:** The components of dependency and of independence were defined and measured in terms of frequency and intensity of behavior.

Four pairs of observers were trained. Each pair worked with a group of 11 children and made three successive ratings after controlled periods of observation. Coefficients of reliability between observers were for the most part +0.90 and above and improved with training.

Analysis of variance was used to determine (a) whether the summated dependency scores differentiated between children, and (b) whether the five postulated dependency components were internally consistent. The same analysis was applied to independence.

**RESULTS OR CONCLUSIONS:** The children from all groups could be differentiated from one another on the basis of both generalized dependency and generalized independence in terms of summated scores (F-ratios significant in all groups).

The five components of dependency were found to be dissimilar from one another (F-ratios significant in two groups), while the five components of independence were found to be internally consistent in all four groups (F-ratios insignificant in all groups).

The coefficient of correlation between dependency and independence was negative ( $r = -0.53$ ) and reliable, but probably not high enough to warrant the assumption that dependency and independence lie at opposite ends of one continuum. (Slides)

10:45 AM Intra-individual vs. inter-individual consistency in children's drawings of a man. DALE B. HARRIS, *University of Minnesota*.

**PROBLEM:** (a) To study individual differences in ten consecutive drawings of a man made during a two-week period by young children. (b) To discover whether rhythmic motor experience preceding the drawing session is "projected" into the children's drawing products.

**SUBJECTS:** Four classes of first-grade children.

**PROCEDURE:** On each of ten consecutive school mornings, the children were asked to draw a picture of a man according to the Goodenough method. One group made drawings following a 15 minute exercise period

in which the children participated in group games, dances and exercises set to music. Two additional experimental groups had one week of drawing preceded by exercise and one week without, in alternation. A fourth group served as a control group, having no exercises during the two weeks.

**RESULTS:** There is no evidence from this study that the rhythmic motor experiences used, emphasizing arm and leg movements, resulted in any alteration of size of man drawn or dimension or angles in the depiction of arms and legs. There is no evidence that the figures drawn following exercise included the element of motion in greater amount than in the control situations. There is ample evidence for the argument that a child draws according to an individual pattern; this study, however, provides no basis for inferring the psychological significance of these patterns. (Slides)

## CHILD DEVELOPMENT II

11:10-11:55 AM, Wednesday, Sparks 10

SIDNEY W. BIJOU, Chairman

11:10 AM Traumatic effect of surgery on the child.

DOROTHY M. SLEIGHT, *McDonogh School*, and  
ROBERT B. SLEIGHT, *Johns Hopkins University*.  
(Sponsor, Robert B. Sleight)

Despite the fact that clinical psychiatric observations and records consistently produce evidence that children undergoing surgery often endure marked emotional disturbances, both of a temporary and/or permanent nature, reference to the traumatic effect of surgery upon the child is relatively rare in both psychological and medical literature. It is the purpose of this paper to review the literature which does exist in the hope that the evidence of trauma of operations in children which undoubtedly lies in office files and case histories may be brought to light.

Methods of preventing the development of post-operative fears in children will be discussed, including intelligent preparation of the child for the event, proper handling of him in the hospitals, and provisions after the operation for expression of tensions and fears.

11:25 AM The behavior settings and the psychological habitat of Raymond Birch. HERBERT F. WRIGHT and ROGER G. BARKER, *University of Kansas*.

In studying the behavior of children under the naturally occurring conditions of life in the small American community of the Midwest, it has been found useful to distinguish three zones of influence: (1) the non-psychological milieu, the totality of physical and geographic, social, economic, political and

ideological conditions which, although they do not affect behavior directly, limit the range of behavior possibilities; (2) the world of behavior settings and behavior objects, a cultural complex made up of the parts of the non-psychological milieu that are generally perceived as appropriate for particular kinds of behavior; and (3) the psychological habitat, the naturally occurring life space or psychological situation of the child.

Methods have been developed for investigating each of these zones of influence in relation to the behavior of the children in a community. One such method is that of the specimen day-record, a detailed narrative account of the conditions of life and the behavior of a child from the time he awakens in the morning until he goes to bed at night.

Upon the basis of data from a specimen record of a day in the life of a seven-year-old Midwestern boy, an inventory of the behavior settings and a partial description of the psychological habitat of this child are presented. These data and the procedures by which they were secured are considered from the standpoint of their significance for ecological research in psychology.

**ACKNOWLEDGMENT:** This paper represents some developments of the Midwest Child Study Project, a continuing study which is being supported, in part, by a research grant from the National Institute of Mental Health, U. S. Public Health Service.

11:40 AM An investigation of aggressive behavior in the doll play of young Sac and Fox Indian children, and a comparison to the aggression of Midwestern white preschool children. JACOB L. GEWIRTZ, *University of Chicago*.

**PROBLEM:** (1) To determine the relationships involved in the doll play method. (2) To investigate the relationships between doll play aggression and the categories of sex and age. (3) To compare the incidence of aggression in the doll play of Indian children to that of a group of white, middle-class, Midwestern children, somewhat younger in age.

**POPULATION:** 28 Indian children of the Sac and Fox settlement at Tama, Iowa, including 9 boys ranging in age from 5-4 to 8-8 and 19 girls ranging from 4-6 to 8-10. The white comparison group (studied by Eleanor Hollenberg) included 15 boys (4-4 to 6-3) and 15 girls (4-7 to 6-4) in the Iowa Child Welfare Station preschools.

**PROCEDURE:** The subjects participated in two standard play sessions which totaled 50 minutes, several days apart. The children were handled by a trained Indian interpreter. Observation categories relating to aggressive behavior in doll play were derived and used. Observer agreement on the categories, based on

3 hours of simultaneous observation by 2 observers of the play of 6 children, was 92%.

**RESULTS:** (1) There was a significant ( $P < 0.001$ ) session-to-session increase in aggression exhibited. A correlation of 0.54 ( $P < 0.01$ ) was found in the incidence of aggression from session to session. (2) Fox boys exhibited reliably more ( $P < 0.05$ ) doll play aggression than did girls. (3) In comparing the Sac and Fox children with somewhat younger white, middle-class preschool children, who were studied under comparable conditions, it was found that Fox boys were significantly less aggressive ( $P < 0.01$ ) in doll play than were the white boys and that Fox girls were significantly less aggressive ( $P < 0.005$ ) than were white girls. (Slides)

### CHILD DEVELOPMENT III

1:40-2:25 PM, Wednesday, Sparks 10

HAROLD H. ANDERSON, Chairman

1:40 PM Developmental aspects of fantasy in normal and schizophrenic children. WILLIAM N. THETFORD, *Michael Reese Hospital*.

**PROBLEM:** In their inner living, children and adolescents demonstrate developmentally some of their most significant personality characteristics. The Rorschach movement response provides us with our most important clues as to the nature and meaning of this inner fantasy. In order to assess adequately what constitutes normal fantasy development, it is necessary to understand the nature of deviations from this norm. The purpose of this paper is to highlight aspects of normal personality development through a comparison with abnormal fantasy living supplied by a group of schizophrenic children.

**SUBJECTS:** The Rorschach records of 50 children between the ages of six and seventeen who had previously been diagnosed as schizophrenic constitute the experimental group for this investigation. In addition, a normal control group of 155 children provides a base line for comparison with the schizophrenic records.

**RESULTS:** The present findings show that schizophrenic children have a quantitatively greater fantasy life than do normals. The importance of considering developmental factors in their relationship to fantasy is emphasized by the findings. There is a progressive increase with each successive age level studied in the quantity of fantasy present. This is characteristic for both the schizophrenic children and the normal controls. At each age level the quantity of fantasy is greatest for the schizophrenic child, with the exception of the adolescent period where no difference is observed between the two groups.

The schizophrenic child's inner living and autistic

expression are both more extensive and deviant from the perceptions of those who constitute the norm. The highly individualized perceptions of the schizophrenic child are revealed by the greater quantity of M minus responses for this group as compared with the normal controls.

Qualitative changes in the type of fantasy observed for the various developmental periods are discussed.

This study was supported by a research grant from the National Institute of Mental Health, U. S. Public Health Service.

1:55 PM Socio-economic status and performance over a four-year period on the ACE of Negro college women from the North and South. S. OLIVER ROBERTS, *Fisk University*.

**PROBLEM:** The hypothesis of this study was that the earlier reported differences in performance on the ACE, associated with socio-economic status and regional origin of freshman women at entrance, would decrease over the span of their college residence.

**POPULATION:** The subjects were 54 young women who entered college directly from high school in September 1945 and graduated in May 1949. Nineteen were from the North and 35 came from the South.

**PROCEDURE:** Two socio-economic levels were established, using the Minnesota classification of the father's occupation. All were given the 1945 ACE in September 1945, the 1946 ACE in May 1947, and the 1948 ACE in May 1949. Total academic achievement was obtained for comparative purposes.

**RESULTS:** Differences in favor of the upper socio-economic level were present in all instances, but these differences were statistically significant for the Southern group.

Subjects from the North were consistently superior to students from the South even when matched for socio-economic status. While the relative difference decreased somewhat, there were still at the end of the period statistically significant differences in favor of the Northern group.

The greater gains made by these students in terms of national norms for comparable periods of time suggest need for general re-examination of conclusions based on freshman tests alone.

Differences in academic achievement, originally in favor of the Northern subjects, had vanished at the end of four years when the total record was considered.

**CONCLUSIONS:** The outcome of this investigation differs in several important respects from the conclusions of Shuey, Klineberg, and some others.

The findings do not confirm the hypothesis advanced, but suggest the probable operation of social and personality factors which are not usually investigated in studies of this character.

**2:10 PM** The development of vocational preferences as revealed in vocational histories obtained by interview. **JOSEPH L. NORTON**, *Michigan State College*, and **RAYMOND G. KUHLEN**, *Syracuse University*.

**PROBLEM:** To describe the development of preferences for vocations and to identify the factors primarily responsible for the emergence of preferences and choices.

**SUBJECTS:** 75 male teachers, 75 female teachers, and 43 factory workers, aged 28-40.

**PROCEDURE:** Vocational histories (preferences, jobs) dating from earliest recollections were collected by interview, the schedule being so arranged that first questions were relatively unstructured with later questions more highly structured and aimed at the role of particular influences. Twenty-five per cent of the interviews were electrically recorded to check on accuracy of the records. The histories were analyzed to determine the nature, age incidence, and duration of various interests and the reasons for their emergence and demise.

**RESULTS:** Mimeographed "handouts" will contain these detailed findings: (1) Women's interests in childhood and adolescence are more homogeneous and less variable than men's. (2) Factory workers show marked vocational apathy, have relatively few interests, with relative late emergence of any interest, and little direction beyond "some job." (3) For the total group of 193 subjects the motivations were ranked: self-expression, status, association with people, money and security, variety in work, helping others. Differences among groups were apparent, with status needs, desire to help others, and association with people being lower for factory laborers. (4) The importance of external influences in shaping interests were (in descending order) family, school, availability of finances, early extended contact with occupation, and friends. Among factory workers, parent and school influences were less, and financial lacks more important; their histories could best be characterized by "lack of stimulation."

## **SYMPOSIUM: RESEARCH AND THEORETICAL PROBLEMS IN CHILD DEVELOPMENT**

**2:50-5:00 PM, Wednesday, Sparks 10**

**GEORGE G. THOMPSON**, Chairman

Egocentric, autistic and social thinking in children.

Participants: **T. W. RICHARDS**, **L. JOSEPH STONE**.

Development of social perceptions in children. Participants: **JOSEPH E. BREWER**, **PAULINE S. SEARS**.

## **BUSINESS MEETING**

**5:00-6:00 PM, Wednesday, Sparks 10**

**ARTHUR T. JERSILD**, President

## **SYMPOSIUM: SOCIAL INTERACTION IN THE CLASSROOM**

**8:50-11:00 AM, Thursday, Auditorium**

(Co-sponsored with Division 15. See Division 15's program.)

## **SYMPOSIUM: NEEDED RESEARCH IN MATURITY AND OLD AGE: SUGGESTIONS FROM CHILD DEVELOPMENT STUDIES**

**1:40-3:50 PM, Thursday, Sparks 316**

**JOHN E. ANDERSON**, Chairman

Participants: **N. W. SHOCK**, **HAROLD E. JONES**, **ROBERT W. KLEEMEIER**, **SIDNEY L. PRESSEY**, **OLLIE RANDALL**.

## **PRESIDENTIAL ADDRESS**

**4:00-5:00 PM, Thursday, Sparks 121**

**ARTHUR T. JERSILD**. *Self-Understanding in Childhood and Adolescence*.

## **DIVISION OF PERSONALITY AND SOCIAL PSYCHOLOGY**

### **FRUSTRATION AND ORGANIZATION**

**11:10-11:55 AM, Monday, Sparks 121**

**RICHARD T. SOLLENBERGER**, Chairman

**11:10 AM** The effect of frustration upon rigidity in problem solution. **RICHARD CHRISTIE**, *Sarah Lawrence*.

**PROBLEM:** Will interpolated frustration increase ri-

gidity of behavior if a set has previously been induced?

**SUBJECTS:** 66 college students and 45 junior high school students.

**PROCEDURE:** All subjects solved four Einstellung problems involving a complicated method of manipulating water containers to get a required answer. Then they received a control problem solvable by the Einstellung solution or a shorter solution involving

simple subtraction. All subjects who used the Einstellung solutions were considered to have established the set. An interpolated problem of entirely different nature was then given to all subjects. The control group received a readily solvable problem; the experimental group received an insolvable problem given under conditions designed to induce frustration. An extinction problem was then given which could not be solved by the set, but which required addition.

The junior high school group received the same problems and the same procedure as the experimental group of college students. 4-point ratings of the degree of frustration on the insolvable problem were made for each subject. The results of the students who were most frustrated were contrasted with those who were rated as being least frustrated.

RESULTS: College students who were frustrated after establishing the set took over twice as long to solve the final problem as did non-frustrated members of the control group. This difference was significant at the 0.02 level of confidence. The junior high school students who were rated as being most frustrated used the set solution over twice as long as those rated not highly frustrated. This difference was significant at the 0.0005 level of confidence.

It was concluded that the effects of frustration upon an established set were such that the strength of the set was increased, and behavioral rigidity was manifested after such frustration.

11:25 AM A comparison of the reactions of whites and Negroes to frustration as measured by the Rosenzweig Picture-Frustration Test. CHARLES N. WINSLOW, *Kent State University*, and JAMES E. BRAINERD, *Bethany College*.

PROBLEM: (1) To compare the responses of Negroes on the Rosenzweig P-F Test with those of the whites used by Rosenzweig in his standardization sample. (2) To determine if there are any differences between the responses of Negroes and whites to frustration when a Negro is the frustrating agent and the responses when a white is the frustrating agent.

SUBJECTS: 170 subjects were used; 120 were Negroes and 50 were whites. The two groups were approximately equated for age, sex, educational status, and socio-economic status.

PROCEDURE: Equated groups of 50 Negroes and 50 whites took the Rosenzweig P-F Test in a modified form in which the frustrated person was depicted as white and the frustrating agent as Negro. One group of 40 Negro subjects took the test under the condition in which a white was portrayed as the frustrating agent and a Negro as the frustrated person. Another group of 40 Negro subjects took a modification of the P-F Test in which both the frustrating agent and the frustrated person were represented as Negroes. A

third group of 40 Negro subjects took the usual form of the P-F Test. The method of scoring the P-F Test described by Rosenzweig was followed.

RESULTS: With the Negro subjects, it was found that the extrapunitive response was given more frequently if the frustrating agent was a Negro than if he was white. More impunitive responses occurred when the frustrating agent was white.

With the white subjects extrapunitive responses were more frequent if the frustrating agent was Negro than if he were white.

On the unmodified Rosenzweig Test the Negro subjects were found to differ from the standardization group of whites used by Rosenzweig in the greater use of ego-defensive and a lesser use of need-persistence responses.

11:40 AM The effect of threat on perceptual-affect. MARVIN ZUCKERMAN, *New York University*. (Sponsor, M. E. Tresselt)

(Abstract exceeded 300 word limit)

## COMMUNICATIONS I

1:40-2:40 PM, Monday, Sparks 121

S. STANSFELD SARGENT, Chairman

1:40 PM Objective studies in meaning. I. A graphic method for representing interrelationships among meaningful concepts. GEORGE J. SUCI and CHARLES E. OSGOOD, *University of Illinois*. (Sponsor, Charles E. Osgood)

The experimental study of meaning (experimental semantics) involves relationships among a large number of variables. The present report concerns the development of a method of representing such interrelationships. Several small samples of semantic material will be used as illustrations, including data on the connotative meaning of colors and evaluations of parent-child relations by a social worker. The companion paper describes the application of this method to analysis of a 40-variable study on the communicative value of facial expressions.

A rapid graphic procedure for representing relationships among  $n$  variables arranged in a correlation matrix is reported in the present paper. Using Thurstone's theorem that "the correlation between any two tests is equal to the scalar product of their test vectors," and assuming vectors of unit length, the linear distance in hypothetical space between any two variables can be determined by substituting the correlation coefficient in a simple formula:  $\sqrt{2(1-r_{ij})}$ . Treating each coefficient in this manner, any correlation matrix can be quickly transformed into a new matrix of representative linear distances. These linear

distances can then be used to construct a graphic representation of the system of relations within the original matrix, where the location of each variable is simultaneously determined by its distance from every other variable.

While not a substitute for factor analysis, this method provides a rapid, yet rigorously objective, means of displaying the patterning or clustering of variables within a matrix. As such it is a useful tool for the research worker. Inspection of such graphic models provides insights into the manner in which semantic or other variables are related and, hence, a basis for the formulation of more fruitful hypotheses. (Slides)

1:55 PM Objective studies in meaning. II. The validity of posed facial expressions as gestural signs in interpersonal communication. CHARLES E. OSGOOD and ALBERT W. HEYER, JR., *University of Illinois*.

The present report applies the method described in the preceding paper to a 40-variable problem—an analysis of the communicative value of posed facial expressions. The usual question in this area, "Are facial expressions valid indices of actual states of the expressor" is seldom really tested, since independent criteria of actual emotional states are typically lacking. A different question underlies the present investigation: what is the validity of facial expressions as signs in interpersonal communication, regardless of the "true" emotional state of the expressor?

Under visual conditions designed to emphasize the lines and shadowing of the face, randomly selected "expressors" posed their interpretations of 40 emotion labels (acute sorrow, determination, etc.). Each "expressor" interpreted 5 labels, and each of the 40 labels was interpreted by 5 different people (in 5 different classroom groups). Approximately 125 judges in all indicated the meaning of each pose by selecting one of the same 40 labels. All of these were written on the blackboard.

Since the purpose was to investigate the meaningfulness of facial expressions to observers, quite apart from the intended meanings of "expressors," the 40 poses were treated simply as a sample of independent stimulus situations. To what extent is selection of one label (e.g., disgust) accompanied by selection or avoidance of each of the other labels (e.g., joy, annoyance, etc.)? To measure this, coefficients of agreement were computed for each label with every other label. This 40/40 correlation matrix was then treated in the manner described in the preceding paper. A readily interpretable 3-dimensional representation of the meaningful relations among these 40 labels for emotional expressions was obtained. (Slides)

2:10 PM An experimental study of the process of communication. HARRY A. GRACE, *University of Illinois*.

PROBLEM: To study the effects of different degrees of knowledge about an audience upon preception as indicated by the immediate recall of the communicator. SUBJECTS: 180 college students, 90 of each sex.

PROCEDURE: The subjects were briefed in the first section of the experimental room; in the second section stood a table on which lay 45 objects, and in the third section the audience waited to hear the subject's report. Fifteen objects were commonly used by males, 15 by females, and 15 were neutral in sex-linkage. Three conditions of briefing were used: audience unknown to the subject before the objects were observed; audience known; and subject distinctly briefed concerning audience. Subjects were run individually. Fifteen subjects from each sex received similar briefing and reported to the same audience. Half of the subjects reported to a male audience and half to a female one. A total of twelve audience-briefing classifications were used. Subjects were given two minutes to view the table after which they immediately reported to the audience. Data were transcribed by a wire recorder.

RESULTS: The data are analyzed by the frequency of total recall, the percentile position of recall of each object, and the rank order of recall. The degree of privacy of each item is related to these data. All data are analyzed by the six briefing conditions. Comparisons are made between the sexes of the subjects, the sex-linkage of objects, the audience-briefing classifications, and the sex of the audience.

CONCLUSIONS: (1) The method used in this experiment appears to be fruitful in the study of the process of communication and the relationships among the variables therein. (2) The relations among the variables are discussed. (3) Conditions favorable to maximum communication are suggested.

2:25 PM Prediction of differential learning from a motion picture by means of "indices of identification potential" derived from attitudes toward the main character. JOHN KISHLER, *Pennsylvania State College*.

PROBLEM: To determine whether differences in identification with, and attitudes toward a film protagonist are related to differences in learning from the film.

POPULATIONS: 1. Two comparable groups of 100 college students—one including those for whom the role of Catholic priest had high prestige, the other for whom the role had low prestige. 2. Two comparable groups of college students differentiated by the criterion of affiliation with the Catholic church: 61 Catholics and 379 non-Catholics.

**PROCEDURE:** Both populations were given a Prestige of Role Scale and an attitude scale on Religious Tolerance. The first population was dichotomized on the basis of the prestige scale, the second on the basis of religious affiliation. All groups were shown "*The Keys to the Kingdom*," and then the two scales were re-administered with an information test based on the film.

**RESULTS:** Results were consistently in the direction predicted with varying degrees of statistical significance. (1) The group holding the role of Catholic priest in high regard showed greater changes of attitude on the Religious Tolerance scale and higher scores on the Information Test. (2) The Catholic group showed no greater change than the non-Catholic group in attitudes toward the Catholic priest in terms of a critical ratio, but did show greater change in terms of an "Effectiveness Index." (3) No difference between Catholic and non-Catholic groups was found in the amount of change in attitudes of religious tolerance. (4) The Catholic group attained a significantly higher mean score on the Information Test than the non-Catholic group.

**CONCLUSIONS:** It is possible to make a prediction of differential learning from a motion picture by means of "Indices of Identification Potential" composed of measures of attitudes toward the main character. Hypotheses concerning the functioning of inter-personal and inter-group attitudes as motives in a learning situation are worthy of further investigation.

This study was done with the Instructional Film Research Program, under contract to the Special Devices Center, Office of Naval Research.

### ATTITUDES AND MINORITY GROUP MEMBERSHIP

2:50-3:50 PM, Monday, Sparks 121

DONALD T. CAMPBELL, Chairman

**2:50 PM** The organization of attitudes toward the Negro as a function of education. LESSING A. KAHN, *Johns Hopkins University*.

**PROBLEM:** Do the factor patterns, as determined by the centroid method from a 12 item attitude scale, differ significantly for educated and uneducated respondents, so that differences in attitude generality can be inferred?

**SAMPLE:** 700 adults participated in the experiment; 350 were relatively well educated (one year or more of college training), and 350 were relatively uneducated (eight grades or less). The two groups were matched for age, sex, nativity, marital status, and religious preference.

**QUESTIONNAIRE:** A 12 item scale was constructed according to Edward's scale discrimination method.

Six general areas in which prejudice toward the Negro is manifest were represented by two items each. These areas were, personality, social relations, civil rights, employment, education, and housing.

**PROCEDURES:** (a) Two matrices of item intercorrelations, one for each of the experimental groups, were factor analyzed using Thurstone's centroid method. (b) Individual item distributions and total score distributions were analyzed.

**CONCLUSIONS:** (a) The organization or structure of attitudes toward the Negro in the two experimental groups was basically alike. (b) Uneducated subjects indicated greater apparent hostility or prejudice toward the Negro than did educated respondents. (c) In explanation of (a) and (b) above, the *ad hoc* hypothesis was advanced that the factor of education has the effect of making possible greater facility for the disguising or masking of underlying prejudices. (d) Generality of attitudes as defined in the investigation did not obtain for either of the experimental groups—rejection of the proposed hypotheses. (Slides)

3:05 PM Social class and race as factors affecting the role of the family in Thematic Apperception Test stories. HOWARD E. MITCHELL, *University of Pennsylvania*. (Sponsor, Malcolm G. Preston)

**PROBLEM:** The purpose of this investigation was to study the effect of cultural status and membership upon the role played by the family in stories evoked by four TAT cards. The hypothesis was that differences in familial role found in comparing sub-cultural groups would primarily depend on one's social class status and, secondarily, on racial membership. A distinctive feature of this study is that the family is described through the individual rather than by applying a direct sociological approach.

**SUBJECTS:** 160 male native born adults residing in metropolitan Philadelphia served as subjects. Participants were divided into 4 subgroups of 40 each: (1) Negro lower social class group, (2) white lower class group, (3) Negro middle class group, (4) white middle class group.

**PROCEDURE:** Four Thematic Apperception Test cards (1BM, 2, 6BM and 7BM), which normally yield family themes, were administered. A rating schedule developed to judge the stories included 17 variables, such as, what are the figures called when mentioned, characterization or description of the familial figures, nature of methods used to motivate hero toward goals, etc. Judgments were made by two groups of 5 trained raters each to insure reliability of data. Methods were used to ascertain those significant differences which obtained among the four sample groups.

**RESULTS AND CONCLUSIONS:** Some social class differences are: (1) middle class stories reveal "warmer"

relationship with father figure; and (2) middle class subjects introduce more familial figures to card IBM, but lower classes mention more familial figures when adults are present in cards. A striking racial difference is that Negroes describe the mother figure as more comforting and loving, but see the father figure in the same perspective as whites. In general, social differences appear to be greater than racial. The utility of the projective method in psycho-cultural research is further demonstrated.

**3:20 PM** Effects of on-the-job experience with Negroes upon the racial attitudes of white workers in union shops. RALPH H. GUNDLACH, *New York City*.

**PROBLEM:** The stereotypes and prejudices of whites against Negroes should be modified as a consequence of work-experience with Negroes, when Negroes are no longer in inferior jobs.

**SUBJECTS:** Subjects were selected from both the sales and office force of a large department store and from two factories doing packaging. Some whites from the department store worked in the same departments as Negroes; some did not. One factory employed Negroes on an equal basis with whites; the other employed Negroes in low-status jobs. Usable interviews from 118 whites and 25 Negroes were obtained.

**PROCEDURE:** The subjects were interviewed in their homes in a survey on "job relations," to minimize influence of the company, union, or associates.

**RESULTS:** An NORC study reported 43% of whites oppose Negroes working on the same job with them; but only 8% of this group express such opposition. In the NORC poll 50% believed Negroes should have the same job opportunities as anyone else and 46% thought whites should have first choice. But 90% of this group think Negroes should have the same opportunities as whites; only 2% think Negroes should be laid off first when jobs are scarce; and another 2% believe whites should go first. The NORC poll showed 40% believed Negroes are inferior to whites, but only 17% of this group agree.

Within the sample, factory workers were least prejudiced, sales clerks were next, and office workers were most prejudiced. Among the sales girls who could easily be divided into all white and mixed departments, the white girls in mixed departments were less prejudiced than their associates.

This study was partly subsidized by the Commission on Community Interrelations of the American Jewish Congress.

**3:35 PM** Methods for changing the attitude of Christian toward Jew. HENRY ENOCH KAGAN, *Columbia University*.

**PROBLEM:** To reduce prejudice between Christian and Jew, "good-will" movements emphasize common religious grounds and increase awareness of Jewish contributions to Christianity. Does this Indirect Method, which does not deal directly with anti-Jewish feelings, decrease prejudice? If anti-Semitism is a displacement of subconscious rebellion against Christianity, knowledge of Christianity's Jewish origin may "boomerang" and aggravate irrational hostility against Jews.

**SUBJECTS:** An experiment testing the Indirect Method was set up in a religious frame of reference in which a single Rabbi was authorized by the Connecticut Episcopal and West Virginia Methodist Churches to teach "Old Testament" to five Christian groups (Experimental—N 168; Control—N 309). The Rabbi taught all groups the same material. Three groups were also encouraged to express feelings about and experiences with Jews; two by group discussion, the Direct Group Method; and one in private interviews, the Focused Interview. The objective of the latter is a catharsis of hostility and reorientation of attitude.

**PROCEDURE:** A scale of 16 items measuring attitudes toward the Jew was filled in before and after the courses and eight months later. It satisfies the criteria of reliability and internal consistency with reliability coefficients of 0.82 to 0.89 and discriminabilities on items of 0.91 to 2.16 (N 477).

Changes in group attitude scores obtained by the Indirect, the Direct Group, and Focused Interview Methods were subjected to statistical analysis.

**RESULTS:** The popular Indirect Method does *not* decrease anti-Jewish prejudice, although it increases awareness of Jewish contributions to Christianity.

The Direct Group and Focused Interview Methods significantly reduce prejudice. The Direct Group Method is the more effective for it lowers the mean score more, and the change is more stable eight months later. Also, by questionnaire on verbal behavior eight months later, respondents changed by the Direct Group Method report the most favorable roles toward Jews in structural group discussions about Jews. (Slides)

## BUSINESS MEETING

4:00-5:00 PM, Monday, Sparks 121

OTTO KLINEBERG, President

## COMMUNICATIONS II

8:50-9:50 AM, Tuesday, Auditorium

(Co-sponsored with Division 9)

CHARLES E. OSGOOD, Chairman

8:50 AM Induction of forces in discussion groups.

MILTON W. HOROWITZ, JOSEPH LYONS, and  
HOWARD V. PERLMUTTER, *University of Kansas.*

**PROBLEM:** An investigation of some of the bases for agreement and disagreement in the discussion group. Since people are perceived as sources of acts, and since there are forces tending toward a balanced unit or configuration of person and act, it was predicted that one's attitude toward a person would determine (with some exceptions) the acceptance or rejection of acts connected with the person.

**SUBJECTS:** This experiment was part of the third summer session of the National Training Laboratory in Group Development. The subjects were all mature adults comprising 2 of the 7 groups at the laboratory.

**PROCEDURE:** The procedure involved questionnaire and interview and was designed to secure two general types of information: First, a determination of valence of each person in the group by every other person in the group ( $p$ th: + or - o), and a determination of agreement or disagreement with certain events as they occurred in the group ( $p$ th: + or - x).

**RESULTS:** The results bear out the preliminary hypothesis. Agreement (or disagreement) with acts in the group is significantly related toward one's attitude toward the person perceived as the source of the act. It is also discovered that each person in the group finds "allies and enemies" in the group with regard to his judgment of these acts and these "allies and enemies" are determined by  $p$ 's attitude toward the others in the group.

9:05 AM The relationship of emotional control as measured on the Rorschach to morally dichotomous thinking. EDWARD E. GLIK, *Fitzsimons General Hospital.*

**PROBLEM:** To investigate the semanticist's thesis of the relationship of neurosis to morally dichotomous thinking; with the hypothesis that such a relationship exists.

**SUBJECTS:** Sixty patients hospitalized for neurotic complaints.

**PROCEDURE:** In addition to the Rorschach test each patient was presented 15 words written on cards with instructions to sort them in three categories: "good," "bad," and "neither." Patients whose color responses were predominantly controlled were compared to those whose color responses were predominantly uncontrolled, with respect to the number of words placed by them in the "neither" category.

**RESULTS:** Patients whose color responses to the Rorschach were predominantly uncontrolled placed significantly fewer words in the "neither" category.

**CONCLUSIONS:** The results indicate that morally dichotomous thinking is related to non-adaptive emotional expression.

9:20 AM Dollard and Mowrer's Discomfort-Relief Quotient (D.R.Q.) in dictated and verbatim social casework interviews. LEONARD S. KOGAN, *Community Service Society of New York.*

**PROBLEM:** A basic assumption of the D.R.Q., when applied to interviews dictated by the caseworker (or counselor), is that such D.R.Q.'s reflect adequately the "tension level" of the client interviewed. This study was designed to determine the relationship between D.R.Q.'s, based on analysis of dictated intake interviews, and D.R.Q.'s based on analysis of the actual client responses, as electrically recorded. A secondary aspect of the study was to investigate D.R.Q. trends in the intake interview.

**MATERIALS:** (1) Regular agency records of 36 intake interviews dictated by four experienced caseworkers and (2) verbatim typescripts of the same interviews.

**PROCEDURE:** After training in application of the "thought-unit" method of scoring D.R.Q.'s, the scorer was tested for reliability of scoring (1) dictated interview material and (2) verbatim interview material. The scorer then produced D.R.Q.'s for the dictated and verbatim interviews, first doing the entire set of dictated interviews, and, then, the verbatim typescripts. D.R.Q.'s were also computed for successive thirds of the verbatim interviews.

**RESULTS:** The reliabilities of scoring for the dictated and verbatim material were, respectively, 0.93 and 0.91, within the limits of the method for determining such reliabilities. The correlation between D.R.Q.'s for the dictated and verbatim records was found to be 0.64. Since all of the D.R.Q.'s involved were higher than 55% (D.R.Q. equals Discomfort Clauses/ Discomfort plus Relief Clauses) for these intake interviews, it seems reasonable to predict an even higher correlation between D.R.Q.'s from dictated and verbatim records for a fuller range of D.R.Q.'s (limits are 0 and 100%). These might be obtained from later interviews.

The trend analysis of D.R.Q.'s in successive thirds of the verbatim interviews indicated some possibility that D.R.Q.'s may be highest (indicating greatest relative distress) in the middle third of the intake casework interview.

9:35 AM The meaning of "democracy" in the Soviet ideology. RALPH K. WHITE, *Washington, D. C.*

**PROBLEM:** If war occurs, it will be partly because of differences between Soviet and Western conceptions of democracy. It is worth while, therefore, to reach the greatest possible clarity with regard to what both sides mean when they use this word. An empirical semantic analysis of this one word may also throw light on the feasibility of comparing value-concepts which are set in widely different cultural contexts.

**PROCEDURE:** A statistical analysis was made (using a

modified value-analysis technique) of the contexts in which the word "democracy" and its near-synonyms occurred in a sample of Soviet writings (Marx, Lenin, Stalin; Pravda, New Times, the Cominform journal), and in a comparable sample of American writings (Jefferson, Lincoln, Roosevelt; New York Times, Life, Chicago Tribune). Use was made of three types of association: simple contiguity, contiguity with implied similarity, and contiguity with implied contrast. RESULTS: (1) The Soviet definition of democracy is not radically different, on the *ideological* level, from our own. There is a point-for-point similarity between the values included in their definition, and those included in ours. The differences lie primarily in emphasis within the same meaning-area, and in the belief-components (as distinguished from the value-components) in their ideology. (2) The idea that they stress government "for the people" and not government "by the people" is mistaken. They stress both. (3) What they do not stress is individual freedom—even on the ideological level. (4) The radical discrepancies between their words and their actions are made possible by: (a) ambiguity in two group-concepts, "people" and "proletariat," (b) ambiguity in four value-concepts, "leadership," "discipline," "unity" and "militancy," (c) at least two highly questionable beliefs, and (d) a tendency to rigidly dichotomous social perception and "intolerance of ambiguity."

### SOCIAL INTERACTION

10:00-11:00 AM, Tuesday, Auditorium

LYLE H. LANIER, Chairman

10:00 AM Social roles and personality traits. S. S. SARGENT and KATHARINE PEASE, *Barnard College*.

A "social role" involves behavior which conforms to the expectations and demands of the members of a social group or social situation. Considerable evidence indicates that a person's social behavior may vary greatly from one situation to another. Thus, a person may be a leader in one group and a follower in another; he may be gay and sociable with friends and taciturn with strangers. Since personality tests are concerned with tendencies or traits like dominance or introversion, which presumably are general (*i.e.*, manifested by the individual in all kinds of situations), psychologists have given little attention to the influence of differing situations.

In order to discover whether one type of social behavior is consistent in different situations, the experimenters devised a test of 36 questions, modified from the Allport A-S Test. Six questions relating to ascendant-submissive behavior were asked about each

of six social situations: classroom, group of friends, group of strangers, boy-friend, girl-friend, and salespeople and waiters. The questions were presented in random order.

The test was given to 122 women undergraduate students. Analysis of variance indicated no overall "situational" differences, as opposed to "trait" differences. However, for some of the six situations the subjects showed fairly consistent reactions which differed from their behavior in other situations. For example, they tended to be submissive in their behavior towards strangers and ascendant in their reactions towards friends. Furthermore, analysis of individual test records showed that the behavior of some persons varies greatly, while that of others shows considerable consistency, from one situation to another.

The findings suggest that "situational" influences or roles are of potential significance, and need to be considered along with the more enduring personality tendencies, in predicting and explaining social behavior.

10:15 AM The effect of prior reinforcement on interaction of observer pairs. BERNARD MAUSNER, *New York University*.

The past experiences of judges with a given class of judgments were investigated as a determinant of interaction between pairs of judges. Previous work by Sherif and others has demonstrated that in situations where pairs of judges respond in a group situation, a social norm of judgment is reached.

Two hundred estimates (in inches) of length of a series of lighted lines were made in a dark room by 38 college students. Half the judges were told they were wrong on 82% of the trials; half were told they were right on 82% of the trials. In a second session, the judgments were repeated. The judges acted in pairs so chosen that the two Os had used different ranges of "number" responses in the first session. In the second session, no statements of right or wrong were made by E.

Separate frequency distributions were made of the "number" responses of Os for each session. A measure of the amount of shift in "number" responses from the Alone to the Together situation was taken (D score). Median responses for each series of 20 stimuli in the course of the experiment were plotted.

It was found that the non-reinforced group of Os (wrong 82%) showed mean D scores significantly higher at the 0.01 level of confidence than did the reinforced group (right 82%). A tendency for non-reinforced Os to converge, and reinforced Os to maintain previous "number" responses was described in the plots of median responses per series of 20 trials.

On the basis of these findings, it is concluded that Os with a past history of reinforcement in a given

type of judgment were less influenced by a coaxing judge than Os with a past history of negative or non-reinforcement.

**10:30 AM** The effects of special training and of knowledge of results upon self insight. JACK R. GIBB and GRACE PLATTS, *University of Colorado*.

**PROBLEM:** To determine whether self insight can be improved through (a) special training during group interaction, and (b) training plus specific individual knowledge of results of tests of self-perceptiveness. **SUBJECTS:** Ninety-six college students, divided into three groups of equal size and matched as to sex, graduate status, and college major.

**PROCEDURES:** A pre-test of self-perceptiveness in a social situation was made upon each of 96 individuals. As a validity criterion, a measure of the composite perceptions of the members of a discussion group was used. Several other measures were made. Each individual was placed in one of 96 separate discussion groups, each composed of one member of the experimental groups and 7 others chosen at random from classes in elementary psychology. After an 18-minute discussion period, each member of a given group was asked to rank each of the 8 members, including himself, on each of 7 arbitrarily-defined personality traits.

(1) Group A was used as a control, with no training. (2) Group B was given training for a period of 9 weeks at such activities as role-playing, process-observing, interaction-analysis, etc. (3) Group C was given training, plus specific knowledge of their scores during the pre-testing, and during certain intra-group personality ratings. Post-tests of each of the 96 individuals were made in 96 new groups in situations directly comparable to those under which the pre-tests were made.

**RESULTS:** Group C, with knowledge of results, made greater gains in self-insight, as here defined, than Group B, which received no direct knowledge. Group B, the training group, in turn, made greater gains than Group A, the control group. Several statistically significant changes, other than those relating to the major hypotheses, are reported.

**10:45 AM** Patterns of social interaction and their relation to personality structure. ABEL GARCIA OSSORIO, *Stanford University* and TIMOTHY LEARY, *University of California*.

**PROBLEM:** This paper reports the findings concerning the relationships existing between social interaction patterns in a group therapy situation and individual personality structure as revealed by other data.

**SUBJECTS:** 21 male college students, ages 18-32, self-referred for psychotherapy. Psychiatric diagnosis ranged from ambulatory schizophrenia to simple

adult maladjustment. The majority of the patients fell within neurotic categories.

**PROCEDURES:** Three groups of seven patients each were formed and met for 24 sessions of group therapy. Data on each subject included: a short autobiography written before therapy, a test battery of a Rorschach, TAT, MMPI, Sentence Completion Test administered immediately before and after therapy, and a follow-up questionnaire. Group data included recorded therapy session protocols and sociometric data obtained at three points during therapy.

**ANALYSIS OF DATA:** Social interactions from transcribed recordings were reliably categorized and ordered within a theoretical framework. Analogous categorizations were made of the other data, allowing descriptions for each individual in terms of interaction patterns, interpersonal traits, modes of behavior, and self-perceptions. These personality descriptions were coordinated variables of group behavior.

**FINDINGS:** (1) Reliably categorized patterns of interaction are presented and related within a conceptual framework to other variables of personality obtained by a variety of methods. (2) Personality concepts such as unconscious conflicts and mechanisms of defense are operationally defined in terms of relationships existing among interaction patterns, perceptions of self and the world, and the groups' perceptions and reactions to the individual. (3) Changes in interaction patterns are used as reliable indices of change in other areas of the personality.

#### SYMPOSIUM: METHODS AND CONCEPTS IN THE INVESTIGATION OF GROUP DYNAMICS

*1:40-4:30 PM, Tuesday, Sparks 10*

ROBERT F. BALES. The communication network as an index of group structure.

ALEX BAVELAS. The information process in small groups.

LAUNOR F. CARTER. Group structure and interaction as a function of task and goal.

RAYMOND B. CATTELL. The formulation of leadership measurement in relation to syntality.

RICHARD S. CRUTCHFIELD. The concepts of morale and leadership.

LEON FESTINGER. Techniques for control and manipulation of variables in laboratory experiment.

ROBERT L. FRENCH. A critique of arbitrary dimensions, with reference to Authoritarianism vs. Democracy.

JOHN K. HEMPHILL. Methods for the empirical determination of group dimensions.

## THE SELF AND ITS DEVELOPMENT

8:50-9:50 AM, Wednesday, Sparks 121

ARTHUR JENNESS, Chairman

8:50 AM Aggression and friendliness as expressed in the dreams of young adults. CALVIN S. HALL, *Western Reserve University*.

PROBLEM: The purposes of this study are (1) to investigate the frequency, intensity and direction of aggressive and friendly acts or feelings in the manifest dream content of young adults; (2) to determine the frequency of aggression and friendliness involving male and female dream characters, older and peer characters, and family members, friends, and acquaintances, and strangers; (3) to show the relationship between aggression and friendliness with respect to the sex and age of the dream characters; and (4) to compare male and female dreamers for all of these variables and categories.

SUBJECTS: Two samples of dreams were selected from the writer's large collection. One sample consists of 400 dreams reported by 200 young adult males and 200 young adult females. The other sample consists of 920 dreams collected from 25 young adult males and 25 young adult females. The second sample was treated quantitatively as a group of 920 dreams and as 50 individual dream series.

PROCEDURE: Dreams were scored for aggressive and friendly acts and feelings by means of numbered categories ranging from mild to intense degrees of aggression or friendliness. Dream characters were counted and classified by age, sex, and relationship to dreamer. Indices of aggression and friendliness were obtained by dividing the number of aggressive or friendly acts involving a given class of characters by the number of characters in that class.

RESULTS: The results obtained and the conclusions drawn therefrom are too extensive to be reported in abstract form. Probably the most striking finding is that the patterns of aggression and friendliness in the dreams of males and females differ in important ways.

9:05 AM An empirical study of the Oedipus complex. STANLEY M. FRIEDMAN, *Western Reserve University*.

PROBLEM: This study deals with the controlled testing of certain aspects of the psychoanalytic theory of the Oedipus complex; namely, that boys have more intense positive (erotic) impulses toward the mother and more negative (hostile) impulses toward the father than do girls.

SAMPLE AND PROCEDURE: The sample consists of 305 boys and girls, evenly distributed between the ages of five and sixteen and obtained randomly from the school system of a suburban community. The children were asked to complete two unfinished fables and to create fantasies for three pictures. The first fable involves a child who spends an enjoyable day with his mother and is then confronted by his father upon arriving home. The second fable reverses the parental roles. The pictures represent father-child, mother-child, and father-mother-child scenes. The first picture also includes a prominent staircase and an overturned doll or wagon. In the second picture, the mother is seated in a room while the child stands in the doorway.

Six independent hypotheses derived from the theory of the Oedipus complex are formulated. These hypotheses are based upon techniques which include (1) analyses of hostile or conflictful fantasies, (2) hostile fable endings, (3 and 4) fantasied paternal reactions to the staircase and overturned toy, (5) fantasied movement tendencies on the mother-child picture, and (6) a projective question asking for designation of the preferred parent.

RESULTS: Five of the six hypotheses yield results which are significant at from the 0.05 (2) to the 0.001 (1, 3, 4) levels of confidence. The technique that yielded only chance results is that which asks for designation of the preferred parent. It is similar to those techniques used in previous unsuccessful studies in this area and was employed for purposes of comparison. The implications of these findings are also discussed.

9:20 AM A developmental study of children's fantasies about moral problems: II. Conceptions of "goodness." MAXINE T. WOLFENSTEIN, *Western Reserve University*.

PROBLEM: This report is part of a larger study concerned with age changes and sex differences in the handling of moral problems. More specifically, it deals with children's conceptions of "goodness" as expressed in their fantasies.

SAMPLE AND PROCEDURE: The sample, taken from a suburban school system, contained 306 "normal" boys and girls, evenly distributed between the ages of 5 and 16, and selected randomly within each age-sex group. Each subject was asked to tell a story about a "good boy (girl)" in the course of an individual interview in which stories about a "bad boy (girl)" and about three projective pictures were also obtained. For purposes of analysis, each story was divided into areas such as: protagonist, motive, kind of good act, reward, and the like. Categories of re-

sponse in each area were described and illustrated in a scoring manual, and each story was scored by three independent raters. Adequate scoring reliability was achieved.

**RESULTS AND CONCLUSIONS:** The conception of "goodness" changes with age from the young child's equating of "goodness" with gratification to the older child's conception of goodness as involving postponement of gratification and leading to future reward. There were significant age and sex differences in the acts characterizing the good child: nurturance, exposure to self-danger, conformity, obedience, etc. Boys' themes often express conflict between moral values and ego integrity, *e.g.*, between suppressing aggression and maintaining "masculinity." There were also age and sex differences in the nature of the reward for goodness: peer recognition vs. adult recognition, affection vs. things, family-derived vs. society-derived, and so on. Comparisons with findings from the stories about a "bad child" are made. The implications of these results for a theory of sex differences in character structure and development are discussed.

9:35 AM A clinical study of role and self in hypnotic age regression. NORMAN L. FARBEROW, *VA Mental Hygiene Clinic, Los Angeles*, and THEODORE R. SARBIN, *University of California, Berkeley*.

A preliminary report on an attempt to determine the interaction of role and self in a specific situation, such as hypnotic age regression, is presented. Data were collected on six male and female college students whose hypnotizability had previously been determined. Rorschachs, Draw-A-Person, and handwriting specimens were gathered for each subject in his waking state, and when regressed hypnotically to ages 18, 13, 6, and 3. In addition, a Rorschach and Draw-A-Person were obtained from two subjects for a simulated age six, wherein the subject was merely instructed to act as if he were six years old. No statistical evaluation is made because of the small number of cases, but some suggestions and some inferences for role-taking theory and hypnotic behavior are presented. Apparently a "core" personality (self) is revealed which persists recognizably, in addition to the role the subject enacts in the various hypnotic situations. For example, vocabulary modifications are made by each subject at each age, although the number of responses remains approximately the same instead of decreasing with earlier ages, as is regularly found in children. Apparently this variable is not included in the subject's role-perceptions. One case is presented in detail. (Slides)

### **SPECIAL PROGRAM: A DEMONSTRATION OF TECHNIQUES USED IN RESEARCH AND TRAINING IN GROUP DYNAMICS**

1:40-3:50 PM, Wednesday, Sparks 121

By the staff of The Research Center for Group Dynamics

### **PERCEPTION AND PERSONALITY I**

10:00-11:00 AM, Thursday, Sparks 121

LAUNOR CARTER, Chairman

10:00 AM Clinical dynamics and auditory perception. RICHARD S. LAZARUS, G. WILSON SHAFFER, CHARLES P. FONDA, and GORDON T. HEISTAD, *Johns Hopkins University*.

**PROBLEM:** This is a pilot experiment which studied psychiatric patients' recognition of auditory stimuli related to their emotional conflicts. An attempt was made to predict which material would be accurately or inaccurately perceived from information derived from case study and therapeutic interviews. It was hypothesized that the readiness of the patient to express or verbalize about the relevant tension areas would determine his perceptual performance. Ready verbalization should produce high perceptual accuracy, while blocking, repression or inability to express this material should lead to relatively poor accuracy.

**SUBJECTS:** Seven patients from the Sheppard-Pratt Psychiatric Hospital were studied and 17 Johns Hopkins undergraduates were employed as controls.

**PROCEDURE:** Forty-five sentences: 15 expressing sexual impulses; 15 expressing hostility; and 15 being neutral, were recorded on a wire. Speech intensity was controlled against a constant noise background so that the overall intelligibility of the words was about 40 per cent accurate. Subjects wrote what they heard after each sentence. The accuracy of perception of the patients on each of the three content areas was computed in standard score units of the control population, and a profile produced for each patient. Independent information about each patient was obtained from the patient's psychiatrist and case history and was compared with the perceptual profile.

**RESULTS:** In every case, performance on the auditory record showed excellent conformity to the psychiatric data. When the patient was identified as "repressed sexually," his score on the sexual material was low. If he freely verbalized or ruminated about his tensions concerning sex, his score, compared with his neutral performance, was high. The pilot study strongly encourages more detailed investigation of

tension areas and clinical mechanisms through auditory perceptual situations. (Slides)

10:15 AM Perceptual defense as a function of unacceptable needs. CHARLES W. ERIKSEN, *Johns Hopkins University*.

PROBLEM: The experimental hypothesis was derived from a conceptual framework which was based extensively upon the personality theory advanced by Murray. The hypothesis predicted that perceptual defense would occur for stimuli or stimulus situations which communicated with needs that were non-syntonic with the individual's ego.

SUBJECTS: The sample was composed of 45 hospitalized psychiatric patients who were equally distributed among the three sub-groups: schizophrenia, paranoid form; chronic alcoholism; and a mixed group whose diagnoses were other than the above two.

PROCEDURE: Three needs, aggression, succorance, and homosexuality, were investigated. A modified Word-Association technique was used as a criterion of the syntonicity or non-syntonicity of each of the three needs. The effect of these needs upon perception was assessed by determining, through tachistoscopic presentation, the perceptual recognition thresholds for various pictures. Of the 16 pictures that were used as perceptual stimuli, 10 were scenes of people engaged in neutral activity, and the other 6 scenes were of people gratifying or in the act of gratifying one of the three needs.

The experimental hypothesis was tested by determining the relationship between disturbance score obtained for a need on the Word-Association test and the perceptual recognition thresholds for the two corresponding need-scenes. In addition a qualitative analysis was made of the pre-recognition hypotheses given by the subjects to the neutral and to the need-scenes.

RESULTS: (1) Significant positive relationships were obtained between the disturbance scores for a need on the Word-Association test and the degree of threshold elevation for perceptual recognition of the corresponding need-scenes. (2) Analysis of the pre-recognition hypotheses provided confirming evidence for the occurrence of perceptual defense.

10:30 AM Motivation and distortion in the perception of behavioral attributes. ALBERT PEPITONE, *University of Michigan*.

This study is concerned with the determinants of "wishful" distortion in the perception of relevant behavioral attributes expressed in a real life situation.

Two degrees of motivation were successfully induced in 88 high school juniors. In those Ss pre-selected for their high sports interest, maximum enthusiasm about winning a ticket to a conference

championship basketball game was aroused; while in the preclassified "low interest Ss," enthusiasm about a ticket to "some school game" was systematically dampened. Winning whichever ticket required that all Ss individually meet and satisfy a three-man board of "coaches," ostensibly making a survey of student opinions on sports.

S then appeared before the three board members whose entire interactions with S and among themselves—questions posed, comments, etc.—were prescribed by a script. Three such "stimulus conditions" were employed.

Condition A: Board members express equal authority; while friendliness differs: one is very friendly, one is nonevaluative, one is negative.

Condition B: Board members express equal authority; while friendliness differs: one is very friendly, one is moderately friendly, one is nonevaluative.

Condition C: Board members are all moderately friendly; while authority differs: one expresses high authority, one medium authority, and one low authority.

Authority was expressed through the use of formal titles, status-laden comments, mannerisms, etc. The friendliness dimension was expressed by the use of S's first name, smiling, sarcasm, etc.

Following the "board meeting," each S was interviewed and ratings of these attributes were obtained. The numerical deviation of S's ratings from a "stimulus reality" established by prior judgments of uninvolved observers and certain additional assumptions constituted distortion. Results indicate that the magnitude of wishful distortion systematically relates to motivation and the degree of environmental restraint. (Slides)

10:45 AM Perceptual aspects of repression. IRWIN M. ROSENSTOCK, *Haverford College*.

PROBLEM: Many experimental investigations of psychoanalytic concepts have been criticized on the grounds that they fail to fulfill the conditions demanded by Freud's definitions. However, it appears that a great part of the difficulty in performing objective studies in this area is due to the equivocality of the psychoanalytic definitions. This condition is quite apparent in the definitions of primal repression and after-expulsion.

One method of overcoming the equivocality of the definitions is to integrate the facts of psychoanalysis and those of a more objectively stated discipline, such as the gestalt theory of perception. In an attempt to apply this solution an experiment was performed. It was hypothesized that repression and perception are intimately related, and that the effects of repression could be observed in perception.

**SUBJECTS:** Thirty-five female and 22 male volunteers from the elementary courses in psychology served as subjects.

**PROCEDURE:** Four experimental sentences were prepared. These described (1) sexual and (2) aggressive attitudes directed toward one or both of the parents. Four control sentences were prepared in such a way as to avoid these attitudes.

Each sentence was placed on a slide and was projected on a screen at 7 different levels of illumination. The illumination level at which a subject could first report a sentence correctly was used as his score for that sentence.

**RESULTS AND CONCLUSIONS:** The experimental sentences are more difficult to see, *i.e.*, they require a greater amount of illumination. Moreover, they are distorted more frequently in the pre-recognition stages.

Sex differences are apparent in the results. Women repress aggressive material primarily, while men emphasize sexual repressions.

The results prove the existence of a relationship between repression and perception. It is suggested that a perceptual approach to personality will aid in the integration of psychology.

### ATTITUDES AND PERSONALITY

11:10 AM-12:10 PM, Thursday, Sparks 121

(Co-sponsored with Division 9)

M. BREWSTER SMITH, Chairman

11:10 AM Authoritarian personality and family ideology: I. A scale for the measurement of traditional family ideology. PHYLLIS E. HUFFMAN and DANIEL J. LEVINSON, *Western Reserve*. (Sponsor, Daniel J. Levinson)

**PROBLEM:** The concept of authoritarian personality, or better, of a broad authoritarianism-equalitarianism personality dimension, has guided several recent studies of the psychodynamics underlying democratic vs. autocratic forms of ideology and group behavior. Authoritarian personality trends, such as punitiveness, cynicism, moral stereotyping, destructiveness, and the like, correlate significantly with ideological patterns, such as ethnocentrism, religious fundamentalism and conventionalism, and certain forms of political conservatism. The present research is concerned with authoritarianism as expressed in ideology about the family.

**PROCEDURE:** The first step was the construction of the Traditional Family Ideology (TFI) Scale, on which high scores were intended to represent an authoritarian view of family structure and childrearing methods, low scores an equalitarian view. The 40 scale items deal with ideas about masculinity-feminin-

ity; "moral training" of children; concentration vs. distribution of power in the family; and the roles of father, husband, mother, wife, and child. "Traditional" family ideology, as it is conceived here, involves: idealization of parental authority; emphasis on dominance-submission in parent-child relationships; a suppressive, threatening type of child training, with moralistic rejection of the child's impulses; status concern; a rigid masculine-feminine dichotomy; and so on.

**RESULTS AND CONCLUSIONS:** In its initial form, applied to several adult evening college classes (N=68), the split-half reliability of the TFI Scale was 0.85. This fact, taken together with the adequate internal consistency (discriminatory power technique of item analysis), suggests that the diverse ideas contained, form a relatively consistent pattern. The TFI Scale correlated 0.60 and 0.70 respectively with scales measuring Ethnocentrism and Generalized Authoritarianism. These results permit a broadening of the concept of authoritarianism and have implications concerning the socio-psychological effects of various family patterns and childrearing methods.

11:25 AM Further investigation of the validity of "authoritarianism" as predictive of ethnic prejudices. SAMUEL H. FLOWERMAN, NAOMI STEWART, and MARION STRAUSS, *American Jewish Committee*.

**PROBLEM:** To investigate the validity of the Authoritarian Scale, in modified form, as predictive of ethnic prejudices for groups geographically removed from those upon which the scale was originally validated.

**SUBJECTS:** Subjects were 808 white, Protestant and Catholic men and women in Baltimore, and 1249 in Minneapolis-St. Paul. This afforded a representative cross-section of the white, Protestant and Catholic population in each city. These were interviewed concerning (1) their attitudes toward various ethnic groups and degree of contact with these groups; (2) age, education, income and similar background items; and (3) their attitudes on various "authoritarian" items which had been selected from those developed by Adorno, Frenkel-Brunswick, Levinson and Sanford, and then reworded for simplification of language.

**PROCEDURE:** Separately for Protestant men and women in each city, correlations between authoritarian attitudes and extent of prejudice toward Negroes, Jews and Catholics were obtained. For Catholic men and women in each city, correlations between authoritarian attitudes and prejudice toward Negroes and Jews were obtained. Additional correlations of these variables with income, age, education, and extent of contact were also computed.

**RESULTS:** Correlations between authoritarian attitudes and prejudice towards Negroes and Jews, although of respectable magnitude throughout (0.30-0.60), were generally lower for the several Minneapolis-St. Paul sub-groups than for their respective Baltimore sub-groups. Correlations between authoritarian attitudes and prejudice toward Catholics were, however, slightly higher for the Minneapolis than for the Baltimore samples, although in both cities these correlations were smaller than the correlations with prejudice towards Negroes and Jews. Other findings concerning prediction of anti-minority prejudices, utilizing authoritarianism scores in conjunction with various items of background information, will also be reported.

11:40 AM "Narrow-mindedness" and ethnocentrism.

MILTON ROKEACH, *Michigan State College.*

**PROBLEM:** (1) To describe a method for studying individual differences in narrowness or broadness of cognitive organization. (2) To determine whether persons differing in ideology exhibit characteristic differences in the degree of "narrow-mindedness" of cognitive organization.

**SUBJECTS:** One hundred and forty-four freshmen, Michigan State College.

**PROCEDURE:** The 10-item Ethnocentrism Scale constructed by Levinson for the Public Opinion Study was administered. Then the following ten concepts, five religious and five political-economic, were presented: Buddhism, Capitalism, Catholicism, Christianity, Communism, Democracy, Fascism, Judaism, Protestantism, Socialism. The subjects were asked to describe in what way any or all of these concepts were interrelated.

**RESULTS:** (1) Individual differences in the organization of the ten concepts ranged along a unidimensional continuum from *comprehensive* to *isolated* to *narrow*. A *comprehensive* organization is one in which all ten concepts are organized into a single integrated structure (e.g., "All are beliefs"). An *isolated* organization is one in which the ten concepts are organized into two or more sub-structures relatively isolated from each other (e.g., "Five are religious, five are government"). A *narrow* organization is one in which one or more of the objectively present parts is missing from the organization (e.g., "Only the religious are related because they believe in God").

(2) The quartile group scoring lowest on the Ethnocentrism Scale organized the ten concepts more *comprehensively* than did the other three quartile groups. The two quartile groups scoring in the middle of the Ethnocentrism Scale organized the ten concepts in a more *isolated* manner than did those ex-

tremely high or low in ethnocentrism. The quartile group scoring highest in ethnocentrism organized the ten concepts more *narrowly* than did the other three groups. All differences between lows, middles and highs in ethnocentrism are statistically significant. (Slides)

11:55 AM The memory process and certain psychosocial attitudes, with special reference to the Law of Prägnanz. JEROME FISHER, *University of California.*

A group experiment was conducted to determine some differential characteristics of the memory process in individuals whose social attitudes and values are at opposite extremes of a prejudice continuum. It was hypothesized that Prägnanz would apply to memory changes, but that the properties of simplicity, symmetry and regularity would obtain more readily for highly ethnocentric persons. It was assumed that these properties reflect processes of narrowing of cognitive maps, of increasing stereotypy and rigidity in memory.

High-and-low prejudiced undergraduates were selected by means of the California Ethnocentrism Scale; they were chosen arbitrarily from the top and bottom 27 per cents of the distributed Ethnocentrism scores of 137 individuals.

Applying the method of repeated reproductions, the subjects reproduced two abstract designs and a story immediately after exposure, two weeks and then four weeks later.

Although the study is exploratory, the following statements seem justified by the results:

(1) Leveling (simplification) occurs consistently in both groups but the Lows show pronounced tendencies to "break" the leveling direction of memory changes in time. (2) With time, tendency toward symmetry increases in frequency among the Highs and decreases among the Lows. (3) Erasures occur more often among the Lows than among the Highs in some reproductions; erasures tend to occur more often when there is less tendency toward simplification and symmetry. (4) Recall of fear themes was differentially significant with time, the Lows recalling more than the Highs. (5) Distortions and omissions appear with approximately equal frequency in both groups.

From the results, the interrelations among personality, psychosocial, and cognitive dynamics are believed to be: *feelings* about remembering may be those of certainty and uncertainty (concerning erasures) depending upon the degree of memorial rigidity and flexibility, respectively; and may be related to avoidance or tolerance of anxieties provoked by ambiguities in the cognitive "field." (Slides)

# **SPECIAL PROGRAM: A SOCIAL PSYCHOLOGICAL STUDY OF THE DECISION-MAKING CONFERENCE**

1:40-3:50 PM, Thursday, Sparks 121

(Co-sponsored with Division 14)

JOHN W. MACMILLAN, Chairman

Participants: DONALD G. MARQUIS, HAROLD GUETZKOW, ROGER W. HEYNS, and JACK N. PETERMAN.

Discussants: EDWIN R. HENRY, RAY BOWERS, and LAUNOR CARTER.

## **DINNER AND PRESIDENTIAL ADDRESS**

6:00-8:30 PM, Thursday, Nittany Lion Inn

OTTO KLINEBERG, *Personality and Politics*

## **PERSONALITY ORGANIZATION**

8:50-9:50 AM, Friday, Auditorium

REX M. COLLIER, Chairman

8:50 AM Discrimination of facial expression and its relation to personal adjustment. SIDNEY J. FIELDS, *Catholic University of America*.

PROBLEM: (1) To determine the presence of individual differences in the discrimination of facial expression as an initial process in the perception and recognition of emotional states manifested by facial expression.

(2) To determine whether the ability to discriminate facial expression is reflected in social and emotional adjustment.

SUBJECTS: 105 male and 102 female government employees, representing various levels of occupational status.

PROCEDURE: A non-verbal matching technique was devised, using as stimuli the Ruckmick (female) and Frois-Wittmann (male) photographs of facial expression. These were arranged into two sets of paired expressions, 20 pairs to each set. The first set (Form M) consists of mirror-image likenesses. It serves as an introduction to Form P, as a crude control, and as a means of establishing a high level of aspiration. In the second set (Form P), a male and a female expression constitute each of the 20 pairs. For the mirror-image pre-test, subjects were instructed to match facial expressions. Reference to matching of sexes or of emotions was avoided. For Form P the instructions were to match a male and a female with the same expression. The Bell Adjustment Inventory was administered to obtain measures of personal adjustment.

RESULTS: (1) Every individual was able to discriminate accurately at least 7 of the 20 expressions pre-

sented. (2) Above this base level of common achievement, scores of performance tend to follow the curve of normal distribution. (3) Sex differences in the ability to discriminate facial expression are not significant ( $CR = 1.09$ ). (4) There is positive correspondence between discrimination and social adjustment. (Product-moment correlation is 0.24, significant at the 0.01 level.) But this is not high enough to warrant individual prediction. (5) No correspondence is shown to exist between discrimination of facial expression and emotional adjustment scores. (Product-moment correlation is 0.03.)

9:05 AM Some effects of social experience upon social insight. JOHN HALL JONES, *Howard College*.  
PROBLEM: To determine the degree of understanding of a professor's personality patterns by students with varying length and intimacy of acquaintance with him.

SUBJECTS: College students and a college professor.  
PROCEDURE: Selected groups of students were given the Bernreuter Personality Inventory and the Allport-Vernon Study of Values, and asked to check it as they thought the professor had checked it for himself, when he took it.

RESULTS OR CONCLUSIONS: It was found that the average score of the various groups of students correlated with the professor's score in direct ratio to the length and intimacy of their acquaintance, but that the intimacy of the acquaintance was the heavily weighted factor. Those who had been with him in non-academic relationships had the most insight. Some multiple correlations were run to ascertain the relationships between the various measures on the two tests and the scores made by the professor.

9:20 AM Some determinants of friendship. WILLIAM R. THOMPSON and RHODA NISHIMURA, *University of Chicago* (Sponsor, Ernest A. Haggard).

PROBLEM: The study was designed to discover some of the determinants of friendship. It was hypothesized that friendships are formed, not so much because the two friends are alike in terms of manifest traits, but rather because each approximates the ideal of the other.

PROCEDURE: Q-technique, chosen as the method particularly appropriate to this problem, was employed as follows: each member of 8 pairs of friends (4 male and 4 female pairs) rated 100 personality traits on a 9-point scale in terms of the extent to which the traits described: (a) the S's own personality; (b) the S's idealized personality; (c) the personality of the S's best friend. Paired-difference correlations were computed between each of these three ratings of the same person, and between the ratings of the

person and those of his friend. As a control, each S also rated the traits for the personality of an acquaintance who was not a close friend. All the obtained correlations were transformed to z-scores, and an over-all analysis of variance made before making separate t-tests. The over-all analysis yielded significant differences between groups of correlations.

RESULTS: (a) The two highest sets of correlations were between: the Ss' ideals and their evaluation of their friends (mean  $r = 0.67$ ), the ideals of friends (mean  $r = 0.62$ ). (b) Lowest correlations were between: the self-evaluations of friends (mean  $r = 0.29$ ); each S's self-evaluation and his evaluation by his friend (mean  $r = 0.40$ ); each S's ideal and his evaluation of a non-friend.

CONCLUSIONS: Friendships are based more on similarities of ideals than actual personality traits. Thus, individuals tend to choose their friends because each seems to the other to reflect what he himself would like to be.

9:35 AM Patterns of response in level of aspiration tasks. LOUIS D. COHEN, *Duke University*.

PROBLEM: It seemed that both the height of the average goal discrepancy score and the method of adjusting goals to success and failure would be necessary in order to describe adequately individual response patterns in a level of aspiration task. Previous studies have tended to emphasize the height of the average goal discrepancy score alone.

SUBJECTS: Fifty white medical patients between the ages 16 and 55: twenty-three male and twenty-seven female, average age 32.3 years.

PROCEDURE: The Rotter aspiration board and task were administered to each subject.

RESULTS: Intercorrelation of a large number of traditional as well as original scores suggested the presence of groups of scores related to two major variables. The average goal discrepancy score and the number of successes seemed related to goal level setting. The percentage of shifts in aspiration bid, the percentage of shifts in the direction of the previous success or failure, the percentage of shifts in a direction opposite to the previous success or failure, and the number of failures to state a bid seemed related to the method of adjusting goals to success and failure.

Rating scales were prepared and reliability of goal level setting ratings gave a Pearson product moment  $r$  of 0.963. Reliability of ratings of methods of adjusting goals to success and failure gave a corrected contingency coefficient of 0.920.

Twelve patterns of response were denoted, involving both the height of goal level setting and the methods of adjusting goals to success and failure. The height of goal level setting was divided into three

groups: high positive, medium, and high negative. Method of adjusting goals to success and failure was divided into four groups: rigid, arbitrary, flexible, and conforming.

## SYMPOSIUM: PROBLEMS IN THE PROJECTIVE STUDY OF SOCIAL ATTITUDES

10:00 AM-12:10 PM, Friday, Auditorium

DONALD T. CAMPBELL, Chairman

Participants: ELSE FRENKEL-BRUNSWIK, EUGENE L. HARTLEY, KENNETH R. HAMMOND, MELVIN SEEMAN, MARION RADKE YARROW, IRVING R. WESCHLER.

## LEADERSHIP

1:40-2:40 PM, Friday, Sparks 121

ROBERT L. FRENCH, Chairman

1:40 PM Verbal output and leadership status in initially leaderless discussion groups. ROBERT L. FRENCH, *Northwestern University*.

PROBLEM: Several investigators of leaderless discussion groups have reported high correlations between the duration of a participant's contributions, and ratings of his leadership by observers or other participants. It is reasonable to assume that this relationship is not necessarily equally large in all situations, but that it depends, rather, upon particular circumstances. This paper will examine this relationship in a number of leaderless discussion experiments designed to test the effects of various factors upon group structuring.

SUBJECTS: Forty-two groups totalling 210 individuals, selected from undergraduate psychology classes.

PROCEDURE: The general procedure in all experiments was as follows; Groups of from 2 to 8 subjects were made up of previously unacquainted individuals. At each session a group discussed a problem of human relations, wrote out conclusions, and filled out an individual questionnaire which included leadership ratings of all participants. Observations included records of time spent talking by each participant.

The separate experiments involved manipulation of the variables (1) time: six 5-man groups met for six sessions each, at weekly intervals; (2) size: six 2-man groups were compared with six 8-man groups, all meeting for one session; (3) motivation: six 5-man, one-session groups competing for a group prize were compared with six similar groups not so motivated; and (4) dominance composition: three series of six 5-man groups were made up on the basis of Factor E scores on Cattell's 16 P.F. questionnaire;

one series of groups with uniformly high dominance, one with uniformly low dominance, and the third with heterogeneous dominance. At a second session half of the groups in each series elected a discussion leader. Comparisons were thus possible between homogeneous and heterogeneous dominance, high and low dominance, and elected leader vs. none.

**RESULTS:** Relationships between verbal output and leadership status will be presented for the various conditions studied, and differences in the relationships discussed.

The experiments were carried out with the collaboration of Kermit Rohde, Christoph Heinicke, Carol Bell, Richard Kramer, Dorothy Murphy and Sheldon Selikoff.

**1:55 PM** The relationship of changing leadership and followership in a group to the changing phases of group activity. **THEODOR D. STERLING** and **BERNARD G. ROSENTHAL**, *University of Chicago*. (Sponsor, Bernard G. Rosenthal)

This study represents one aspect of an integrated social, psychological, and clinical study of a group—from its origin through its development and termination over a period of twelve weeks. TAT's, sentence completion tests, sociometric indices, and other social, psychological, and clinical techniques were used to understand and predict the individual and group behavior. The group consisted of 16 persons from the fields of the ministry, labor, and various academic disciplines.

This paper is concerned with the problem of (1) the determination of the different leaders and followers in the group at different phases of group activity and development; (2) psychological characterization of the specific different phases and activities of the group process, and the relation of the specific personality traits of the different leaders and followers to the psychological characteristics of the different phases of the group during which they are leaders or followers.

Sociometric indices and careful analyses of group behavior and transcripts of group meetings were used to determine leaders and followers. Sentence completion tests and TAT's were used to determine the personality traits of leaders and followers. A recently developed method of analyzing group process was used to characterize psychologically the various phases and activities of the group.

Results indicate that leaders and followers at different periods of the group may be identified by the relating of sociometric indices, group observations, and group transcript analyses in various ways. Leaders and followers change with different psychological phases of group process, the same leader usually coming to the fore as similar psychological phases of the

group reoccur, e.g., phases of group aggression are usually related to leadership by the most aggressive people in the group. There is a significant relation between personality traits of the leaders and followers, and the psychological characterization of that phase or activity of the group in which they appear as leaders or followers.

Specific data will be presented on these points. (Slides)

**2:10 PM** Validity of leaderless group discussion observers' descriptive and evaluative ratings for the assessment of personality and leadership status. **BERNARD M. BASS** and **OTTEY L. WHITE, JR.**, *Louisiana State University*.

**PROBLEM:** Previous studies by the senior author indicated that the Leaderless Group Discussion provided a reliable technique for the assessment of certain aspects of personality. These studies suggested that valid assessment of personality and leadership status could be made by means of the LGD. This paper will report an empirical study of what is predicted by LGD observers' assessments of LGD participants' personality and behavior.

**SUBJECTS:** Eighty-seven members of a college fraternity.

**PROCEDURE:** Seventy-five of a possible 87 fraternity members submitted ballots on which they voted each other high, middle, or low on 7 items such as "Whom would you select to address an audience of alumni?" and "Who usually organizes things around the house?" The standard procedure for "buddy ratings" was used and a criterion score on each item as well as a total criterion score was obtained for each of 87 members. Following this, 47 members were motivated to participate in six leaderless group discussions. Monetary prizes were awarded to the "highest rated" participants. Two trained observers who were not familiar previously with the members of the fraternity, sorted the 8 participants of each discussion into flexible high, middle, and low categories on 14 descriptive or evaluative items such as, "Who led the discussion?" and "From whom would you have liked to have heard more?"

**RESULTS:** Corrected split-half reliabilities of the 7 criterion buddy ratings were all 0.90 or above. The composite buddy rating had a reliability of 0.96.

The placement of LGD participants into the high or low categories by both observers were correlated with the criteria. Biserial  $r$ , corrected for widespread classes, was used.

Most intercorrelations fell between 0.25 and 0.60. Aside from being a demonstration of the validity of leaderless group discussion observers' ratings, this study disclosed many interesting relationships among variables measured. The matrix of intercorrelations

among criteria and LGD observer assessments will be presented along with pertinent conclusions.

2:25 PM Are leaders and followers identified by similar criteria? RAY C. HACKMAN and REXFORD G. MOON, JR., *University of Maryland*.

PROBLEM: To determine the extent to which leaders and followers are identified by similar criteria and to differentiate between selected and rejected leaders and followers by means of personality sketches and psychological test results.

SUBJECTS: Fifty students in a course in tests and measurements at the University of Maryland, distributed into two laboratory sections of 23 and 27 individuals.

PROCEDURE: Each individual was asked to nominate from the members of his section (a) two persons to serve as a leader of a committee of which the nominator is to be a participant; and (b) two persons to serve as committee members on a committee of which the nominator is to be chairman. Also, each individual was asked to nominate two individuals in each case who would be unacceptable to him in either role. Prior to the time the nominating was done, each individual was asked to write a brief personality sketch of every other member in his section. Test data were available since a standard battery of psychological tests was routinely administered to all individuals as a part of the course.

RESULTS: In each section a high correlation was found between the frequency with which the same individuals were nominated both as leader and follower. Rank order coefficients based on frequency of nomination were  $-0.86$  and  $-0.85$  for the two sections. Examination of the test results and the personality descriptions suggests numerous hypotheses about leader and/or follower selection. As an example, frequency of nomination correlates negatively with score on the persuasive key of the Kuder Preference Record within the selected leader and follower criterion groups, but the same relationship is positive within the rejected leader and follower criterion groups.

## PERCEPTION AND PERSONALITY II

2:50-3:50 PM, Friday, Sparks 121

JAMES J. GIBSON, Chairman

2:50 PM The "schematizing process": perceptual attitudes and personality qualities in sensitivity to change. PHILIP S. HOLZMAN, *Winter V.A. Hospital*, and GEORGE S. KLEIN, *Menninger Foundation*.

PROBLEM: The "schematizing process" (identifying and integrating sense-impressions) reflects typical

forms of ego control over perceptual processes. Distinctive schematizing patterns appear when stimuli are gradually but constantly varied in size through a wide range. This report describes (a) individual differences in response to changing stimuli; (b) one basis for understanding these differences through perceptual attitudes of "leveling" and "assimilation," or of "differentiation" and "contrast"; and (c) the relation of these attitudes to personality qualities.

SUBJECTS: 50 adult men and women.

PROCEDURE: Fourteen squares ranging from 1 to 14 inches were projected successively and judged for size. Squares 1-5 were seen for a total of 15 trials. Then, without the subject's knowledge, square 1 was removed and square 6 added. In this way the midpoint of the series was moved gradually upward until all of the squares were seen, making a total of 150 judgments.

RESULTS: Subjects' performances took consistent forms. One group increasingly underestimated, responding to changing stimuli either late or not at all (*adaptation lag*). Another shifted appropriately throughout. Those who lagged showed decreased sensitivity to stimuli when they were in the middle of the range of 5 squares being shown. Those who shifted appropriately were sensitive to stimuli when they occupied a middle position as well as when they held the more distinctive end positions. Groups selected by this criterion also differed significantly in three independent tests of extraction from a context (Gottschaldt figures, penetration of camouflage, and color contrast).

With Q-technique, using a trait-universe compiled from Murray's definitions of needs, these perceptual attitudes are found to be linked to personality qualities which are tentatively named: a *self-constriction* vector (rigidity, apprehensive-passivity, naivete) and a *self-outward* vector (manipulative, flexible, energetic).

CONCLUSION: Patterns of psychophysical response express stable perceptual attitudes and are predictive of personality tendencies. (Slides)

3:05 PM The influence of personality variables and experimental frustration on performance in a size constancy experiment. JEROME L. SINGER, *University of Pennsylvania*. (Sponsor, Frances W. Irwin)

PROBLEM: This experiment is one of several employing size constancy situations with factorial design as a paradigm for observing how central and peripheral variables interact in perceptual response. The hypothesis was that personality (thinking intro-extroversion) and momentary motivation (experimental frustration) influence size perception. It was felt that extroverts, being more "field-dominated," are

less able to avoid using cues or knowledge in making perceptual comparisons. Furthermore, if Lewin's view of frustration is correct, the frustrated subject should find it more difficult to differentiate the perceived stimulus from the field cues, thus showing high constancy.

**SUBJECTS:** 36 male college students selected as extreme introverts (18) or extroverts (18) from respondents to Guilford-Martin's STDCR Thinking Scale. Subjects were randomly assigned to conditions: extroverts-frustrated, extroverts-nonfrustrated, introverts-frustrated, introverts-nonfrustrated.

**PROCEDURE:** The constancy situation involved equating nearby comparison stimuli to 8 cm. standard squares, 10 and 35 feet away. Instructions emphasized "look" attitudes, minimizing use of distance cues or judgment.

The frustrated subjects were subjected to an unsolvable modification of the Vigotsky Test. Controls judged questionnaire item scale-intensities in the corresponding period.

**RESULTS:** The experimental variables differed in effect at the two distances. At 10 feet extroverts showed significantly greater constancy than introverts. Only introverts showed possible frustration effects. At 35 feet both intro-extroversion and frustration-nonfrustration proved significant as predicted. Frustrated subjects manifested greater constancy, with frustrated extroverts even overestimating the distant standard.

**CONCLUSIONS:** These data support diverse findings of Brunswik, Weber, and Lewin. Within limits, central factors play decided roles in determining constancy. Thinking introverts and extroverts differ in relative dependence on environmental cues. When frustrated, both groups become more "field-oriented," less able to differentiate their percepts and to avoid habitual distance corrections. Reality limits frustration effects. In more difficult perceptual situations, however, frustration may lead to overestimations.

3:20 PM Value, need, and attitude toward money as determinants of perception. BERNARD G. ROSENTHAL and JANICE HOUGHTON LEVI, *University of Chicago*.

**PROBLEM:** (1) How do economic status, social class values, and other factors effect perception of size of coins? (2) What attitudes toward money do rich and poor children have, and how are they related to perception of size of coins? (3) How do these above phenomena develop in rich and poor children from six to ten years?

**SUBJECTS:** Sixty rich and 60 poor children ranging in age from six to ten years.

**PROCEDURE:** The child, seated 12" in front of a box, turns a dial to vary a circle of light on a screen of

the box from  $\frac{1}{16}$ " to  $\frac{3}{4}$ " in diameter. He makes a judgment of size of penny, nickel, dime, quarter, half dollar from both ascending and descending positions.

Method of average error was used to obtain estimates of size of coin. Judgments were made under the following conditions: memory; coin on hand; coin on glass; and aluminum disks. Order of presentation of coins and order of presentation of above conditions were varied systematically. An analysis of variance design was constructed to determine significance of each of the above conditions in the perceptual process.

A questionnaire was administered to each child to discover his values concerning money: what he would do with it; how he would spend it; what he thinks money will buy; his concept of rich and poor; etc.

**RESULTS:** Results indicate that the rich 10-year-olds' estimates of size of coins are significantly greater for every coin than those of the poor 10-year-olds. The rich children show a significantly greater tendency to say they would spend money on themselves rather than on others in contrast to the poor. Again the rich children show a significantly higher tendency to say they would save their money rather than spend it in contrast to the poor. These data hold for the 10-year-old group. Other data on these and other points will be presented for other age groups. Data on the contributions of the several experimental variables listed above to the perceptual distortion of rich and poor will be presented. (Slides)

3:35 PM An exploratory investigation of autistic perception. KENDON R. SMITH, *Pennsylvania State College*, GARDINER B. PARKER, *University of Alabama*, and G. ALLEN ROBINSON, JR., *Columbia University*.

**PROBLEM:** Several experiments have suggested the existence of autistic perception, and important inferences have been drawn from these experiments. None of the studies, however, provided methodological assurance that the subjects were actually *perceiving*, and not simply *reporting*, autistically. Furthermore, each involved relatively few subjects and employed somewhat trivial incentives. The present study attempted, in an exploratory way, to remedy these methodological deficiencies, and to investigate rigorously the existence of autistic perception.

**SUBJECTS:** Forty-six male undergraduates.

**PROCEDURE:** Random assortment provided a control and an experimental group, each of 23 subjects. Each group participated separately in a "contest" in span of visual apprehension. In each contest the same series of 50 clusters of dots was projected tachistoscopically; the subjects attempted to judge the number of dots in each cluster. Responses were not forced. In-

correct responses were penalized heavily and equitably. A correct response by a control subject scored one point; by an experimental subject, one point per dot in the cluster. The scoring system was meant to insure perceptual reports, motivation toward realistic perception in both groups, and conflicting motivation toward autistic exaggeration in the experimental group. Prizes of ten and five dollars were awarded in each contest.

**RESULTS AND CONCLUSIONS:** There appeared a distinct initial tendency toward overestimation by the experimental group, statistically significant for the groups employed, but not definitely generalizable beyond these groups. The hypothesis of autistic perception was thus supported.

This investigation was pursued within, and supported by, the Department of Psychology of Princeton University.

### PROBLEMS IN METHODOLOGY

4:00-5:00 PM, Friday, Sparks 121

WILBERT S. RAY, Chairman

4:00 PM An investigation of two different methods for evaluation of interviewer job performance.

NAOMI STEWART and SAMUEL H. FLOWERMAN, American Jewish Committee.

**PROBLEM:** To examine the validity of current procedures for evaluating job performance of interviewers engaged in public opinion interviewing, and to investigate the potentialities of a new method for detecting interviewer distortion.

**SUBJECTS:** Fifteen interviewers were hired through ordinary channels and instructed to interview designated respondents. Certain respondents, unbeknownst to the interviewers, had been "coached" in advance, and all such interviews (33) were recorded by concealed wire recorder. Remaining interviews (over 150) were not recorded. The 50-item interview schedule included attitudes toward Jews and Negroes, some items requiring an authoritarian or a democratic response, and some miscellaneous and factual items.

**PROCEDURE:** The following were obtained for each interviewer: (1) Various measures of effectiveness of job performance, obtained by detailed scoring of the recorded interview transcriptions and schedules; (2) "traditional ratings" of quality of interviewer performance, made upon the *unrecorded* interview schedules in accordance with methods currently utilized by such organizations as NORC, Gallup and Roper, which stress obvious omissions in the schedules; and (3) a new measure—"displacement score"—based on data in the schedules covering the *unrecorded* interviews with respondents processed by each interviewer. This was essentially a measure of *dis-*

*crepancy*, for each such sub-sample of respondents, between their mean attitude toward either Negroes or Jews and their mean "authoritarianism."

**RESULTS AND CONCLUSIONS:** The validity of the "traditional ratings" appears questionable because omissions from the schedule (such as *no answer's* and *can't decide's*) seem to be ambiguous indicators of interview quality—related in one fashion to non-cheating errors, in another fashion to cheating errors. The new measure, "displacement score," was found to be significantly related to cheating behavior; related in the same direction, but not significantly, to non-cheating errors. It appears to constitute a valid indicator of distortion contributed by the interviewer.

4:15 PM Effective items in the measurement of personality integration. LOUIS L. MCQUITY, University of Illinois.

**PROBLEM:** To determine the characteristics of personality inventory items which are most effective in measuring personality integration. (Previous studies by the author have indicated that diversity of self endorsements is valid in measuring personality integration, in the sense that diversity scores give highly significant differences between groups of mental hospital patients and community persons.)

**SUBJECTS:** 130 mental patients and 84 community persons, all males who have been college students.

**PROCEDURE:** (a) The discrepancy between an individual's total diversity score and his score on a pair of items is accepted as an index of the effectiveness of the pair of items. Using this principle, a criterion of internal consistency is applied to arrange items in rank order of their effectiveness. (b) The ability of the criterion to select the better items is studied by comparing the differentiation between mental hospital patients and community persons obtained from: (1) diversity scores on the total test; (2) diversity scores when only the better test items, as determined by the criterion, are used; and (c) the ranked items are studied for quantitative and subjective differences.

**RESULTS:** (a) Quantitative: Intercorrelations of answers are higher for the better items than for the poorer items, except for pairs of items whose answer patterns indicate that the questions represent synonyms or antonyms. This latter group is poor even though the intercorrelations of answers are high.

(b) Subjective: The better items appear to differ from the others in that they request answers which seem to depend on subjective rather than objective criteria, and seem to be generalized and vague rather than specific and definite.

**CONCLUSION:** These results indicate that further improvement can be obtained in the measurement of personality integration, and that disintegration appears more in vague, subjective and generalized opin-

ions of self, rather than in the realm of objectivity or logical deductions.

**4:30 PM** The detection and measurement of faking on personality inventories. ERNEST C. TUPES, *Lackland Air Force Base.*

**PROBLEM:** One of the disadvantages of personality inventories is that their validity is limited by the subject's willingness to correctly answer questions concerning himself. That is, personality inventories can be "faked" or "thrown." In many situations, it is difficult to prevent "faking good," or Facading, and the problem is to develop a valid measure of Facade which can be used to estimate the "true" personality profile.

**SUBJECTS:** 159 elementary psychology students; 91 experimental psychology students; 430 graduate students in clinical psychology; 7 outpatients in a V.A. Mental Hygiene Unit.

**PROCEDURE:** Subjects filled out the Guilford-Martin Personality Inventory GAMIN twice, once with instructions to answer honestly and once with instructions to answer as they would if applying for a job. Those items which were answered significantly differently under the Honest and Selection instructions were put into keys with which answer sheets could be scored to obtain estimates of Facade.

**RESULTS AND CONCLUSIONS:** When GAMIN answer sheets from seven groups were scored with the GAMIN FACADE key, the mean scores of the groups differed in magnitude significantly. The order of the group means corresponded exactly to the order expected when the groups were examined as to strength of motivation to fake good. Facade scores of 128 graduate students correlated significantly (0.01) level with all but one of 13 personality trait scores. The  $r$ 's ranged from -0.09 to 0.83 indicating that much of the variance of the traits could be accounted for by Facade.

It is concluded that this study has yielded a measurement of the extent to which subjects have faked

good which has sufficient validity to be used in a formula to correct personality-trait scores for faking—a correction which seems indicated by the sizeable correlations between Facade scores and obtained personality trait scores.

**4:45 PM** Role of anonymity in attitude surveys. JACK ELINSON and VALERIE T. HAINES, *Department of Defense.*

**PROBLEM:** The traditional requirement of anonymity in attitude studies hinders measurement of individual change over time, and the determination of relationship between verbal and non-verbal behavior. The problem arises as to the nature and extent of influence of the anonymity factor in attitudinal investigations.

**SUBJECTS:** 398 Army enlisted men and 735 Air Force enlisted men constituting representative samples of men completing enlistment terms within three months.

**PROCEDURE:** Identical questionnaires were administered to two random samples from the same population. In one group, a guarantee of anonymity was given; in the other, respondents were instructed to write their names and serial numbers on the questionnaires.

**RESULTS:** On virtually all attitudinal areas covered in the questionnaire a higher proportion of men expressing favorable attitudes (from a military point of view) was found in the non-anonymous or "signed" group. No source of difference other than the anonymity factor was suggested by a comparison of ten background characteristics. The magnitude of the differences on attitudinal areas varied considerably with the particular attitudinal area and some hypotheses as to the reason for this variation can be framed. The use of Chi-square to test the significance of differences found raises an important question in psychological statistics or logic: which distribution is to be considered the theoretical one in this type of problem—that of the anonymous group, the non-anonymous group, or an average of the two?

## THE SOCIETY FOR THE PSYCHOLOGICAL STUDY OF SOCIAL ISSUES

### COUNCIL MEETING

8:50 AM-5:00 PM, Sunday, Willard 108

DANIEL KATZ, President

### BUSINESS MEETING

7:45-9:00 PM, Sunday, Auditorium

DANIEL KATZ, President

### PRESIDENTIAL ADDRESS

9:00 PM, Sunday, Auditorium

### SYMPOSIUM: COMMUNITY MENTAL HEALTH RESEARCH

8:50-11:00 AM, Monday, Sparks 121

KEITH J. PERKINS, Chairman

Participants: JOHN CLAUSEN, ERICH LINDEMANN, ROBERT HEWITT, DAVID ABERLE, and BURTON FISHER

### KURT LEWIN MEMORIAL AWARD MEETING

4:00-5:00 PM, Monday, Auditorium

DONALD W. MACKINNON, Chairman

### COMMUNICATIONS II

8:50-9:50 AM, Tuesday, Auditorium

(Co-sponsored with Division 8. See Division 8's program.)

### OPEN COMMITTEE MEETING, SPSSI COMMITTEE ON INTERGROUP RELATIONS

10:00 AM-12:10 PM, Tuesday, Osmond 110

ROBERT CHIN, Chairman

### SYMPOSIUM: PLANNING FOR INTERNATIONAL SOCIAL PSYCHOLOGICAL RESEARCH

1:40-3:50 PM, Tuesday, Sparks 121

OTTO KLINEBERG, Chairman

Participants: DAVID KRECH, JEROME S. BRUNER.

### EDWARD L. BERNAYS AWARD MEETING

4:00-5:00 PM, Tuesday, Auditorium

ROBERT B. MACLEOD, Chairman

### OPEN COMMITTEE MEETING, SPSSI COMMITTEE ON THE TEACHING OF SOCIAL PSYCHOLOGY

10:00 AM-12:10 PM, Wednesday, Sparks 121

WILBERT S. RAY, Chairman

### DINNER AND SYMPOSIUM: INTERDISCIPLINARY RESEARCH IN LABOR-MANAGEMENT RELATIONS

6:00-8:00 PM, Wednesday, Nittany Lion Inn

(Co-sponsored with Division 14 and Industrial Relations Research Association)

GEORGE W. TAYLOR, Chairman

Speakers: RENSIS LIKERT and W. ALLISON CHALMERS

### OPEN COMMITTEE MEETING, SPSSI COMMITTEE ON INTERNATIONAL RELATIONS

8:50-11:00 AM, Thursday, Sparks 316

JEROME S. BRUNER, DORWIN CARTWRIGHT, Chairmen

### ATTITUDES AND PERSONALITY

11:10 AM-12:10 PM, Thursday, Sparks 121

(Co-sponsored with Division 8. See Division 8.)

### SYMPOSIUM: WHAT MANAGEMENT WANTS FROM THE SOCIAL SCIENTIST

1:40-3:10 PM, Thursday, Sparks 10

(Co-sponsored with Division 14 and the Industrial Relations Research Association)

MERELITH B. GIVENS, Chairman

Management's Viewpoint: C. L. HUSTON, *Lukens Steel Company*; ROBERT HILKERT, *Federal Reserve Bank*.

Discussants: ARTHUR KORNHAUSER, WILLIAM MCGEHEE, JOHN R. P. FRENCH, JR., and HOWARD KALTENBORN.

### SYMPOSIUM: WHAT LABOR WANTS FROM THE SOCIAL SCIENTIST

3:20-5:00 PM, Thursday, Sparks 10

(Co-sponsored with Division 14 and the Industrial Relations Research Association)

MEREDITH B. GIVENS, Chairman

Labor's Viewpoint: VICTOR REUTHER, *United Auto Workers*

Discussants: ARTHUR KORNHAUSER, WILLIAM MCGEHEE, JOHN R. P. FRENCH, JR., HOWARD KALTENBORN, and DAVID KAPLAN.

### SYMPOSIUM: ETHICAL IMPLICATIONS OF ACTION RESEARCH

1:40-3:50 PM, Friday, Sparks 10

ROBERT B. MACLEOD, Chairman

Participants: DONALD G. MARQUIS, ROBERT LYND, and RONALD LIPPITT.

### DINNER AND OPEN COMMITTEE MEETING, SPSSI COMMITTEE ON ATOMIC EDUCATION

6:00-8:00 PM, Friday, State College Hotel

STUART W. COOK, Chairman

## DIVISION ON ESTHETICS

## ESTHETICS

1:40-2:25 PM, Tuesday, Willard 108

ROBERT M. OGDEN, Chairman

1:40 PM The time error in esthetic judgment. GILBERT BRIGHOUSE, *Occidental College*, and SOON DUK KOH, *Seoul Women's College*.

**PROBLEM:** To investigate the time error in esthetic judgments of visual stimuli observed under the same experimental controls used in psychophysics; to determine the relation between presentation order of paired stimuli and the appearance of TE; to determine the relation of the pause-interval between paired stimuli to the appearance of TE; to determine the effects of preferences for stimuli on the TE.

**SUBJECTS:** 258 college students.

**PROCEDURE:** Three different kinds of stimuli were used: 10 pairs of Munsell colors; 11 pairs of achromatic designs; and 14 pairs of chromatic paintings. The stimuli were presented to groups of subjects by means of opaque projectors. The methods of Successive Paired Comparison and of Single Stimuli were both used, with 3 different pause-intervals. Three-seconds exposure time was used.

**RESULTS:** Some significant TE's were found for painting stimuli, particularly with the 7-sec. pause-interval. For the color and design stimuli, the TE's were less conclusive. Both positive and negative TE's were found. The subjects' preferences for particular stimuli were related to negative TE's. The significance of these findings for Lauenstein's assimilation theory and Woodrow's set theory will be discussed in relation to experimental esthetics. (Slides)

1:55 PM The masculinity and femininity of musical phenomena. PAUL R. FARNSWORTH, J. O. TREMBLEY, and C. E. DUTTON, *Stanford University*.

A number of musical therapists have assumed that certain musical phenomena, including the works of several of our most eminent composers, are generally regarded in our culture as masculine in character while other musical forms and compositions are typically reacted to as feminine. It has further been assumed that the more masculine a person's mentality the more approval he will give to music of a masculine character. The reverse is thought to be true for those of "feminine mentality." This notion is made use of in the "iso" principle of musical therapy.

To verify in part the above assumptions, two experiments have been conducted on 206 college students. Composers' names and a number of musical phenomena have been rated for masculinity-femininity. Phonographic recordings have, also, been

given ratings for "sex character." The subjects have been given tests to assess the extent of their musical interests and training and the masculinity or femininity of their temperaments.

The data disclose consistent sex characterizations of composers and of musical phenomena which, in the main, support the contentions of the psychoanalysts. The compositions of Bach, Beethoven, Shostakovich, and Wagner were regarded as particularly masculine and those of Debussy, Mendelssohn, Schubert and Chopin, as essentially feminine. In general the subjects, particularly the men, preferred and were more familiar with the composers of masculine music. Musical interest and training and masculinity or femininity of interest as measured by the Terman-Miles and Strong scales did not appear to be related in any differential fashion to interest in music of either sex characterization. One exception to this latter generalization could be seen in the fact that women with the most masculine interests tended more than did the other women to prefer the classical (more masculine) period of music.

2:10 PM A functional test of rhythm. RALEIGH M. DRAKE, *Kent State University*.

**PROBLEM:** Construction and validation of a rhythm test which will measure rhythmic response rather than just a perceptual comparison of a pattern of clicks. The test is intended to be part of an aptitude battery for testing musical talent.

**SUBJECTS:** Musicians and students.

**PROCEDURE:** A tempo is established by recorded metronome beats. Subjects are to sense (feel) the tempo and then maintain the same rate during a period of silence. A second part of the test presents a distracting rate during the former period of silence. The subject is to maintain the established tempo in spite of the distracting tempo.

**RESULTS OR CONCLUSIONS:** Validity and reliability studies are given to indicate the value of the procedure in measuring musical talent. Comparisons are made with other tests of rhythm.

## PRESIDENTIAL ADDRESS AND BUSINESS MEETING

2:25-3:50 PM, Tuesday, Willard 108

NORMAN C. MEIER, *Instrument Measurement of Audience Reactions*.

**PROBLEM:** To devise an instrument (Meier Audience-Response Recorder) for individual registration of reaction continuously to an on-going complex stimulus; to test the operation of the instrument in actual situa-

tions by obtaining recordings of audience reactions by multiple units, and to devise graphic measures to express in the form of composite profiles the significant measurement aspects of the total audience reaction.

**SUBJECTS:** A stratified sample of typical theater audiences (frequent attenders, occasional attenders, age, sex, and occupational strata).

**PROCEDURE:** After perfecting the measuring instrument (AJP, 63, No. 1, 87-89) recordings were obtained of reactions to the play *Life with Father*. The individual records (obtained by a battery of ten recorders through ten performances) were then converted into composites by the method of superimposition. From the composites median positions and semi-interquartile points were located for each 30 seconds of the play. On the points so established three profiles (Med, Q1 and Q3) were plotted, which, synchronized with the script, provide a graphic record of the continuous audience reaction.

**RESULTS:** The procedure demonstrates (a) the workability of the measurement and (b) the actual feasibility of obtaining by means of the procedure a trustworthy profile of the audience reactions for each moment of the play, first on individual wax-impregnated tape (stylus-marked), and then on the derived composite (audience) records, for total audience and for strata of the sample. The procedure makes possible (a) disclosure of degree of interest aroused at any point in the play, low and high levels of impact, and other aspects of audience response, and (b) a graphic record of the success or failure of the script to fulfill the requirements of dramatic presentation. Other theoretical aspects will be discussed.

Acknowledgment is made to Prof. E. C. Mabie, Director of the University Theatre (Iowa), who made the tests possible, and to Harold Hayes (University of Minnesota) who ran subjects and plotted profiles as part of a larger study. (Slides)

## DIVISION OF CLINICAL AND ABNORMAL PSYCHOLOGY

### SYMPOSIUM: IMPLICATIONS OF THE FINDINGS OF THE VA PROJECT ON THE SELECTION OF CLINICAL PSYCHOLOGISTS

10:00 AM-12:10 PM, Monday, Auditorium

ERNEST R. HILGARD, Chairman

Participants: FRANK BARRON, JOSEPH M. BOBBITT, LEE CRONBACH, DONALD W. FISKE, ROBERT HOLT, and E. LOWELL KELLY

### SYMPOSIUM: PSYCHOLOGY IN THE FIELD OF COMMUNITY MENTAL HEALTH

1:40-3:50 PM, Monday, Auditorium

JERRY W. CARTER, JR., Chairman

CARL L. ANDERSON. The community mental health consultant.

EDITH E. LORD. Psychology in a state mental health program.

JOSEPH E. BREWER. A community program of psychological services.

MARIE SKODAK. The role of psychology in a public school system.

WAYNE DENNIS. Psychology in the field of public health.

### PRESIDENTIAL ADDRESS AND BUSINESS MEETING

7:00 PM, Monday, Auditorium

CARL R. ROGERS. *Where Are We Going in Clinical Psychology?*

### ROUND-TABLE DISCUSSION GROUP: PSYCHOLOGICAL ASPECTS OF PHYSICAL DISABILITIES

8:50-11:00 AM, Tuesday, White Hall 105

(Co-sponsored with Division 16)

LOUIS LONG, Chairman

Participants: THEODORA ABEL, WILMA DONAHUE, JAMES F. GARRETT, LEE MEYERSON, and MORTON A. SEIDENFELD.

### ROUND-TABLE DISCUSSION GROUP: RAMIFICATIONS OF THE H-T-P TECHNIQUE

8:50-11:00 AM, Tuesday, Carnegie 1

JOHN N. BUCK. Qualitative evaluation of quantitative scores.

LINDA CARTER. Qualitative scoring points in H-T-P's of children.

SELMA LANDISBERG. Results of therapy reflected in the H-T-P.

ARTHUR WEIDER. Longitudinal study of a case of prefrontal lobotomy.

KAREN MACHOVER and CLELLAN MORGAN. Criticisms of the preceding presentations and of the entire technique.

**ROUND-TABLE DISCUSSION GROUP: OBJECTIVES, PROCEDURES AND METHODS IN SUPERVISING CLINICAL TRAINEES AND INTERNS**

8:50-11:00 AM, Tuesday, Sparks 10

GLADYS L. ANDERSON, Chairman

JOSEPH E. BREWER. Supervision of interns in a community guidance center.

ABRAHAM CARP. Supervision of clinical trainees in a neuropsychiatric hospital.

O. HOBART MOWRER. Training in psychotherapy.

SEYMOUR B. SARASON. The psychologist's behavior as a research area.

**ROUND-TABLE DISCUSSION GROUP: PSYCHODRAMA: CURRENT USES AND PROBLEMS IN DIAGNOSIS AND THERAPY**

8:50-11:00 AM, Tuesday, Sparks 121

DORIS TWITCHELL-ALLEN, Chairman

Participants: JAMES M. ENNEIS, ROSEMARY LIPPITT, DWIGHT W. MILES, and J. L. MORENO.

**ROUND-TABLE DISCUSSION GROUP: THE PERCEPTION OF MOVEMENT IN PICTORIALLY PRESENTED STIMULI**

8:50-11:00 AM, Tuesday, Sparks 316

JOSEPH ZUBIN, Chairman

RUDOLPH ARNHEIM. Movement perception in art.

RALPH M. RUST. Scales for the movement response on the Rorschach.

J. R. WITTENBORN. The factorial composition of the movement response.

**SYMPOSIUM: ANALYTICALLY ORIENTED THERAPIES**

1:40-3:50 PM, Tuesday, Auditorium

THEODORA ABEL, Chairman

Participants: BRUNO BETTELHEIM, HARRY BONE, ROBERT MORROW, LEWIS R. WOLBERG, and FREDERICK WYATT.

**DIAGNOSTIC TESTS FOR CHILDREN**

8:50-9:50 AM, Wednesday, Auditorium

MAUD A. MERRILL, Chairman

8:50 AM Differences between verbal and performance IQ's on the Wechsler Intelligence Scale for children. HAROLD G. SEASHORE, *Psychological Corporation*.

**PROBLEM:** In clinical practice and research, discrepancies in IQ's or ranks on tests are considered important. One of the more common comparisons is the difference between a subject's Verbal IQ and Performance IQ. This paper (a) will explore the theoretical bases for evaluating the discrepancies a subject shows on different tests; (b) will report an analysis of Verbal IQ and Performance IQ discrepancies for subjects examined with the WISC; and (c) will suggest considerations to govern the interpretations of IQ discrepancies by clinical examiners.

**SUBJECTS:** The study uses the 2200 boys and girls, ages 5-15, tested in the standardization of the WISC. **PROCEDURE:** For each of the subjects, an IQ discrepancy score (Verbal IQ minus Performance IQ) is determined. Some of these differences are due to test unreliability. Statistical procedures to determine the magnitude, variability, and significance of the differences in IQ's are applied. The score distributions are analyzed in terms of age, parental occupation, and urban-rural residence.

**RESULTS:** (1) One can expect an average discrepancy of about 8 points between a subject's Verbal IQ and his Performance IQ on the WISC. (2) The plus and minus discrepancy scores are about equal in frequency and magnitude and are distributed normally about a Verbal and Performance difference of zero. (3) Age does not seem to be a factor in the direction or size of the discrepancy of scores. (4) Generally, children with various occupational backgrounds have similar discrepancy scores. (5) Among rural children, there are more cases with higher Performance IQ's and among urban children more cases with higher Verbal IQ's. (6) These distributions of IQ discrepancy scores are normative for the WISC and should govern interpretations of the Verbal and Performance IQ's of individual children and researches based on differences between clinically identified groups.

9:05 AM A normative study of human figure drawings for children. PAUL A. NOLLER and ARTHUR WEIDER, *University of Louisville*.

**PROBLEM:** The purpose of this study is to standardize a draw-a-persons technique for children and to estab-

lish norms for age, sex, and intellectual level for various drawing characteristics.

**SUBJECTS:** 475 white boys and girls in the Louisville Public Schools ranging in age from 7 to 12 and in IQ from 60 to 130.

**PROCEDURE:** The children were given two sheets of  $8\frac{1}{2} \times 11$  white paper and asked to draw a person on one of them. They were then asked to draw on their second sheet a person of the opposite sex from the one just completed. The following characteristics of the drawings were recorded for each subject: sex of the first figure drawn, sex of the larger figure, whether drawings were full face or profile, placement of drawings on the paper, the actual height of each drawing, and the difference in height between the drawings. These drawings were then separated according to the sex, age, and IQ of the subject. Norms were established separately for the boys and the girls for different ages.

**RESULTS:** It was found that the sex, age, and IQ of the subject are significant factors related to what will be drawn and that this relationship can be measured. When scored quantitatively this technique offers significant objective data regarding the subject. It is possible to utilize qualitative cues which enhance this technique's projective properties. Objective evidence to confirm or deny clinical impressions of some previous workers with human drawings will be explored. In addition, various child developmental features (psycho-motor, psycho-social, psycho-sexual) as revealed by their drawings will be scrutinized. (Slides)

9:20 AM A tension index of adjustment based on picture stories elicited by the Michigan Picture Test. RALPH E. WALTON, GWEN ANDREW, and SAMUEL W. HARTWELL, *Michigan Department of Mental Health*, and MAX L. HUTT, *University of Michigan*.

The Michigan Picture Test, developed during a three year research program, is a new projective personality test suitable for use with children in the 8 to 14 year age range. The test was developed out of a comprehensive study designed to provide a valid measure of maladjustment and of specific personality conflicts, as well as to provide normative data on emotional reactions of children, as given in picture stories. Two papers, one on the diagnostic and therapeutic possibilities of this test, and another reporting an appraisal of the stimulus value of the pictures, have been previously presented.

This paper will present evidence of tension states in discriminating the degree of adjustment. It was the aim of this phase of the study to develop a "tension index" that would objectively discriminate maladjustment on the basis of verbal expressions of conflict, unresolved needs, fear and guilt. It was hoped that,

in this way, some of the usual difficulties involved in theme analysis might be avoided.

The analysis for this part of the study was made on the stories told by 45 children selected from the large number of school children and clinic cases included in the study. The procedure was to determine what needs are elicited by a common group of pictures and which of these verbalized needs discriminate between well and maladjusted children. Weights were empirically assigned to those needs which did discriminate, and the sum of the weighted scores was called the "tension index." Deviations from the tension index which the pictures normally produce were tested for significance in discriminating types and degree of maladjustment. Cross validation between school and clinic cases will be presented.

9:35 AM Early childhood recollections: An integrative technique of personality test data. JANET S. GREENE and ASYA L. KADIS, *New York City*.

(Abstract exceeded 300-word limit.)

## RORSCHACH

10:00-11:00 AM, Wednesday, Auditorium

(Co-sponsored with the Society for Projective Techniques)

MARGUERITE R. HERTZ, Chairman

10:00 AM Rorschach patterns as a tool in predicting success or failure in the rehabilitation of the physically handicapped. JOSEPH LEVI, *Bellevue Medical Center*.

**PROBLEM:** The purpose of the study is to correlate certain personality characteristics as revealed in the Rorschach with the progress of the patient in rehabilitation.

**SUBJECTS:** The Rorschach Test was administered to 100 physically handicapped patients. Ages ranged from 18 to 56. Sexes were equally divided. The disease categories include: paraplegia, quadriplegia, hemiplegia, poliomyelitis, Multiple Sclerosis and Parkinsons Disease.

**PROCEDURE:** Criteria for rehabilitation is based upon the patient's achieving his maximum physical ability as evaluated by the staff. The group of 100 patients examined by the Rorschach method were rated according to degree of achievement in rehabilitation. From this group, the Rorschach records of the ten who rated the maximum, and the ten who rated the minimum degree of physical achievement were selected for study.

**RESULTS:** The group that made the minimum progress in rehabilitation indicated a uniform pattern on the Rorschach. This pattern is characterized by a high

percentage of anatomy responses (60% or more). The group that made the maximum achievement in rehabilitation revealed two varying patterns on the Rorschach: (a) a Rorschach pattern which showed a minimum degree of deviation from normal personality. (The Monroe Inspection technique was used.); and (b) a neurotic Rorschach pattern, the outstanding feature of which is a high degree of superego and guilt feeling. (The criteria for this pattern will be elaborated on.)

CONCLUSIONS: (1) A high percentage of anatomy responses on the Rorschach may suggest a high degree of preoccupation with one's own body to the exclusion of outside interests. This finding would correspond to the psycho-analytical meaning of narcissism. (2) The closer the personality approximates the normal, the greater probability the individual has for achieving the maximum physical rehabilitation. (3) Certain neurotic personality structures presenting high degrees of neurotic guilt feelings achieve a maximum degree of physical rehabilitation. These may corroborate the Freudian view that some neurotics who become physically ill lose their neurosis.

10:15 AM Perceptual attitudes of "form-boundedness" and "form-lability" in Rorschach responses. GEORGE S. KLEIN, *The Menninger Foundation*, and HERBERT J. SCHLESINGER, *Winter VA Hospital*.

PROBLEM: Interpretation and validation of the Rorschach require a rationale of perceptual and other processes inherent in its scores. This report experimentally defines one perceptual attitude reflected in certain score constellations: tolerance for instability and change in the perceptual field. One expression of this is the degree to which "reality testing" rigidly requires the stability of known forms ("form-boundedness" vs. "form-lability"). Persons so selected by tentative Rorschach criteria were tested on independent perceptual tasks highlighting these attitudes: apparent movement (*phi*), and flicker fusion. *Phi* represents a "compromise" solution between the need to stabilize an ambiguous field and the knowledge that the stimuli are really stationary. Range of experienced movement, therefore, indicates readiness to accept such a compromise. The flicker fusion experience requires the stabilizing of an unstable field. The hypothesis holds that where ego controls unduly stress the preserving of known forms and a stable field ("form-boundedness"), the range and comfortableness of movement experience will be restricted and the fusion threshold lowered.

SUBJECTS: Two groups of 10, patients and staff of a psychiatric hospital.

PROCEDURE: Subjects were selected by clinicians other than the experimenter on the basis of Rorschach cri-

teria which apparently convey the perceptual attitudes of "form-boundedness" and "form-lability," and then tested for range of *phi* on six stimuli differing in meaning, "formedness," and disparateness, and for *cff*.

RESULTS: (1) The groups differed significantly in *cff* thresholds and in qualitative and quantitative response to *phi*, the range being restricted in the "form-bound" group. Several overlapping cases provided opportunity for reviewing the Rorschach criteria of the perceptual attitudes. (2) The groups responded differently to varying stimulus-forms.

CONCLUSION: Certain Rorschach score constellations relate to perceptual attitudes which are experimentally definable; these permit validation based upon a rationale of *process* rather than upon "inkblot characteristics." (Slides)

10:30 AM An experimental investigation of the affective value of color on the Rorschach Test.

HOWARD W. GOODMAN, *University of Pittsburgh*.

PROBLEM: To discover the relationship between response to color on the Rorschach and affect as determined by concomitant psychogalvanic activity.

POPULATION: Fifty male, white patients, 27 with current diagnosis of "psychoneurosis" or "anxiety state" and 23 non-psychiatric patients ready for hospital discharge.

PROCEDURE: The PGR phenomenon measured is the Tarchanoff effect, *i.e.*, a direct measure of electrical potential. Principal apparatus included a Breaker Type DC amplifier and an Esterline-Angus Recording DC Milliammeter. With the exception of the cup electrodes on the subjects' hands, all equipment was concealed.

After a preliminary check with word associations to 20 words of the Kent-Rosanoff list, each subject was given the Rorschach, administered in all respects according to current practice. Precise synchronization of PGR records with test protocols was accomplished by means of a foot operated key which allowed the examiner to record on the PGR record the time of presentation of each card, the beginning and end of each response, etc.

The usual Inquiry for the Rorschach was conducted after the electrodes were removed from the subjects' hands.

The method selected for analysis of the PGR data expressed the electrical activity for each card as a whole in terms of millivolts of deflection per unit of time.

CONCLUSIONS: Within the limits of this experiment, the assumption that color on the Rorschach is an emotional stimulus and is reacted to as such is not valid. Although the individual cards have different affective value for different individuals, no single card

is consistently a more effective emotional stimulus than any other card. Similarly, neither the color determinants used nor the presence or absence of "color shock" are related to the affective value of the cards on which they appear.

10:45 AM Electroencephalographic validation of the Rorschach, Hunt, and Bender Gestalt Tests. T. CUNLIFFE BARNES, *Hahnemann Medical College*.

PROBLEM: To aid the interpretation of the electroencephalogram by psychological tests.

SUBJECTS: 1291 persons including normal college students and hospitalized patients whose electroencephalograms were recorded. Patients with epilepsy or brain damage formed the largest groups. Not all tests could be given each person owing to age, severity of illness, or limitation of time.

PROCEDURE: Six channel electroencephalograms were taken together with skin temperature, vital capacity, blood-sugar electrocardiogram and respiratory tracing (see *J. Psychol.* 22:67, 1946). The Rorschach, Hunt, and Bender Gestalt Tests were given immediately before or after the electroencephalogram.

RESULTS: The alpha index could not be correlated with any other factor except remission of psychotics. Unexpectedly there were more recoveries in mental cases with lower alpha indices. In 189 patients (not mental), 25 had superior Rorschach scores and of this group only 8 had abnormal electroencephalograms; 81 patients with average Rorschach scores had 24 abnormal electroencephalograms; while 83 patients with abnormal Rorschach scores had 49 abnormal electroencephalograms. With an abnormal Rorschach the chances of having an abnormal electroencephalogram are twice as great as with a normal Rorschach. Perseveration, blocking, and absence of human forms in motion were found with slow waves in the electroencephalogram. No correlation between the Rorschach and the electroencephalogram occurred in children. Slow waves produced by deep-breathing were not related to any psychological test (except the Bell Inventory) but were found in persons having large lung power in relation to body weight and height (former athletes). The Hunt Test for Cerebral Damage averaged 8 points higher with abnormal electroencephalograms. An acoustical tumor was localized by the word-pair score. Perseveration and distortion of designs in the Bender Gestalt Test were found with abnormal electroencephalograms.

### PERSONALITY STRUCTURE

11:10 AM-12:10 PM, Wednesday, Auditorium

JEAN W. MACFARLANE, Chairman

11:10 AM Concept formation as a function of personality structure. G. K. YACORZYNSKI, *Northwestern University Medical School*.

It is generally assumed that in the psychoses, especially in schizophrenia, a disorganization of the thought process exists. Such conclusions are based upon results of tests which demand that the patient use a predetermined category in solving a particular problem. The present study attempts to determine what concepts the psychotics are actually capable of using without imposing upon them the necessity of using any particular method.

Matched groups of 30 manic-depressives, 30 schizophrenics, and 40 controls were used as subjects. In addition the test was administered to over 200 clinical patients with various psychological and organic difficulties.

The test allows the individual to use any of eight categories in sorting a group of blocks. These consist of shape of the block, shape of the figure on the block, color of block, color of figure, area of top of block, area of figure, height of block, and volume. Complete freedom of choice is allowed, and the subject is tested until he exhausts all of the possibilities. CONCLUSIONS: If psychotics are allowed a freedom of choice in using various concepts, they are capable of using as many concepts as normal subjects. The often-reported inability of psychotics to use concepts is largely due to forcing the patient to use a particular category in solving a problem. Differences appear among the manic-depressives, schizophrenics, and controls in the use of concepts. All of these differences can be accounted for on the basis of emotional and personality factors, rather than a disintegration of the thought process. Information from additional clinical subjects suggests that relationships between the personality factors such as those measured by the Rorschach and concept formation exist. (Slides)

11:25 AM The relationship between examiner personality and obtained Rorschach protocols; an application of interpersonal relations theory. DANIEL R. MILLER, RICHARD SANDERS, and SIDNEY E. CLEVELAND, *University of Michigan*.

PROBLEM: To what extent are examiner differences related to the Rorschach protocols of subjects? Are there any significant relationships between the subjects' Rorschach scores and certain examiner personality variables?

SUBJECTS AND PROCEDURE: Nine second-year, white, male graduate psychology students were administered the Rorschach test, Thematic Apperception Test, and Minnesota Multiphasic Personality Inventory. The students were members of a course in projective techniques, and, at the time of testing, had had no

previous training in this area. They were then trained in Rorschach administration and inquiry.

Each student examiner then gave 30 Rorschach tests to randomly assigned, white, male, volunteer college sophomores from 18 to 24 years of age. Following the test administration, the sophomore subjects answered a questionnaire on their perceptions of the examiners. Rorschach protocols were assigned in random order to the authors, and scored blindly. Two Ph.D. clinical psychologists then made independent blind analyses of the examiners' own Rorschach, TAT and MMPI records, and ranked the examiners on anxiety and hostility.

**RESULTS:** The reliability of the authors' scoring ranged from 0.81 to 0.99. Of the fifteen scoring symbols, eleven had reliability coefficients ranging from 0.90 to 0.99. An analysis of examiner variance on 37 Rorschach variables yielded nine F's which were significant at the one per cent level or less, and thirteen between the two and five per cent levels.

F's were computed for each Rorschach symbol between the three highest and three lowest examiners on two sets of anxiety and hostility continua obtained from experts' rankings and subjects' questionnaire responses. Differences among these groups were examined, and implications were developed for the administration of the Rorschach test and for interpersonal relations theory.

11:40 AM The organization of hostility controls in various personality structures. SEYMOUR FISHER and EDITH HINDS, *Elgin State Hospital*.  
(Abstract exceeded 300-word limit.)

11:55 AM Personality structure of chronic alcoholics. ERWIN SINGER, *New York University*.

**PROBLEM:** This study was designed to investigate the nature of the personality structure of chronic alcoholics; the dynamic roots of the symptom of alcoholism; and whether the personality structure and/or the roots of the symptom vary in chronic alcoholics when different psychiatric groups are considered.

**SUBJECTS:** Two groups of chronic alcoholics were studied, (1) 34 male chronic alcoholics diagnosed as psychoneurotic, and (2) 30 chronic alcoholics diagnosed as character disorders cases. Subjects for both groups were drawn from a psychiatric hospital population in a random fashion. Inclusion in the research population was contingent upon the subject's fulfilling the criteria for alcoholism and being classifiable as a member of either diagnostic group.

**PROCEDURE:** Case histories, Wechsler-Bellevue Test results, Rorschach records of all subjects in both groups, and Thematic Apperception Test records of 29 of the psychoneurotic and all of the character dis-

orders cases were collected and analyzed. Quantitative as well as qualitative analyses were carried out. Data obtained in this manner were subjected to three comparisons: (1) results obtained on the two groups were compared with each other and tests of significance applied where possible; (2) results obtained on the psychoneurotic group were compared with available data on psychoneurotic patients who were not chronic alcoholics; and (3) results obtained on the character disorders group were compared with available data on character disorders cases who were not chronic alcoholics.

**RESULTS:** (1) No quantitative and but minimal qualitative differences between the two groups of chronic alcoholics were obtained; (2) the findings on either group were at marked variance with what has been commonly considered characteristic test productions of psychoneurotic patients and character disorders cases who were not chronic alcoholics; (3) a personality configuration was detected which appeared fairly consistent for members of either group. This configuration supported, in many ways, psychoanalytic concepts of the dynamics of alcoholism, i.e., in terms of lack of self-esteem; super-ego strength; hostility, and its genesis and management.

## SYMPOSIUM: INTERPRETING THE TAT

1:40-3:50 PM, Wednesday, Auditorium

(Co-sponsored with the Society for Protective Techniques)

ROBERT R. HOLT, Chairman

Participants: WILLIAM E. HENRY, DANIEL J. LEVINSON, LESTER LUBORSKY, JULIAN B. ROTTER, and FREDERICK WYATT

## RESEARCH IN THERAPY

8:50-9:50 AM, Thursday, Elec. Engr. 110

DAVID SHAKOW, Chairman

8:50 AM The experimental application of psychotherapy as a learning technique. THEODORE LANDSMAN, *University of Delaware*, and ARTHUR W. COMBS and KENNETH PETERSON, *Syracuse University*.

**PROBLEM:** To estimate the effects on objective learning and personality from client-centered psychotherapy adapted to a learning technique as contrasted with a syllabus-centered classroom method.

**SUBJECTS:** 126 college students grouped in 8 classes in a Human Growth and Adjustment course with three different instructors.

**PROCEDURE:** Student-centered methods as adapted from client-centered therapy and syllabus-centered methods are defined. Instructors are trained to use both methods. Classes are grouped into four pairs with subjects balanced according to intelligence scores, thereby making four replications of the experiment. Each instructor teaches one or two groups using the student-centered method and one or two groups using the syllabus-centered approach. Check-ups during and at the close of the study indicate instructors maintained differences between methods in their different groups. Subjects are tested before and after study with Troyer-Horrocks standardized Test of Knowledge of Facts and Principles and a staff-constructed test to determine comparative gains in such learning. Personality effects are measured by before and after administrations of the Minnesota Multiphasic Personality Inventory, the Munroe Group Rorschach, and a projective autobiographical technique. Two administrations of a sociometric test are utilized to trace changes in acceptance of other classmates. Subjects' attitudes toward groups are ascertained by student-written evaluations.

**RESULTS AND CONCLUSIONS:** Results are presented to demonstrate whether the psychotherapeutic method was inferior, equal or superior to the syllabus-centered method in effecting immediate and significantly different learning gains, personality, or sociometric changes. The analysis of gain scores on each test for the contrasted group is reported. (Slides)

9:05 AM. A specific relapse phenomenon during the course of electric convulsive therapy. RODERICK W. PUGH, *Hines VA Hospital*.

**PROBLEM:** This reports one of the findings of an exploratory descriptive investigation of some psychological processes accompanying concurrent electric convulsive therapy and non-directive psychotherapy with paranoid schizophrenia. The psychological processes involved were identified by 18 categories for the analysis of psychotherapeutic interviews. There were 14 categories relating to feeling expressions (positive, negative, etc.), and designated "affective" categories. There were 4 "non-affective" categories. The problem was to determine the course followed by these categories throughout treatment and to determine the statistical significance of trend changes between stages of treatment.

**SUBJECTS:** The subjects were 6 World War II veterans who met specified diagnostic criteria for paranoid schizophrenia.

**PROCEDURE:** The treatment began with an interview, and, thereafter, an interview followed by 24 hours or more every second shock treatment until sixteen shock treatments and 9 interviews were completed.

A tenth and final interview followed a two-week treatment rest. Interview records were verbatim.

**RESULTS:** Consistent reversals of trend occurred in certain categories between the tenth and twelfth ECT's (the period covered by the sixth and seventh interviews). The reversals were indicative of negative therapeutic movement, or a relapse in a course of improvement. Each subject demonstrated the reaction in from 5 to 11 of the categories. The affective categories were most reactive, especially negative and positive feelings directed towards others. Feelings toward the self were most stable during the relapse. There was early and often immediate recovery of the previous therapeutic course of movement.

**CONCLUSIONS:** The important fact is the specific localization of the relapse phenomena. The findings for these six subjects are clear. However, the nature of the study precludes broader generalizations at present. Although the individual effects of the therapeutic interviews and the convulsive treatments were not controlled, it may be logically hypothesized on the basis of other evidence that the relapse phenomena were most likely an effect of the latter.

9:20 AM Factor analyses of psychoanalytic, non-directive, and Adlerian therapeutic relationships. FRED E. FIEDLER, *University of Chicago*.

**PROBLEM:** Previous investigations by the writer indicated that: (1) therapeutic relationships can be quantified by means of Q-technique; and (2) relationships created by experts of the psychoanalytic, nondirective, and Adlerian schools are more like the "ideal" therapeutic relationship than those created by nonexperts of these schools. (3) Experts of one school created relationships more like those of experts of different schools than like those of nonexperts within the same school.

The present paper will discuss the results of four factor analyses of therapeutic relationships created by two psychoanalytic, two nondirective, and one Adlerian expert, and two psychoanalytic, two nondirective, and one Adlerian nonexpert.

**PROCEDURE:** Assessments of each of ten electrically recorded therapeutic interviews were made by one psychoanalytically, one nondirectively, one untrained judge, and one judge who had had some psychoanalytic and some nondirective training. The four judges listened independently to these interviews and assessed them in terms of 75 traits which are descriptive of therapeutic relationships. Ratings of each of the judges were then factor analyzed by Thurstone's method.

**RESULTS AND CONCLUSIONS:** The factor analyses yielded no factors which clearly differentiated therapists of one school from those of another, but several

factors were found which differentiate experts from nonexperts. These differentiating factors are related to the therapist's ability to understand the patient's feelings, to be more secure, and to react in an emotionally neutral manner. Authoritarian and tutorial attitudes, passive or nondirective attitudes on the part of the therapists, were outweighed in importance by the communication aspects of the interaction.

These results will be discussed in light of Sullivan's and Rogers' theories, as well as to implications for training in psychotherapy.

9:35 AM Group therapy with institutionalized male juvenile delinquents. CHARLES GERSTENLAUER, *New York State Training School for Boys.*

PROBLEM: The purpose of this investigation was to evaluate changes in intellectual, emotional and social adjustment in a group of institutionalized male juvenile delinquents who participated in 20 sessions of group therapy.

SUBJECTS: Forty-four boys of the New York State Training School, age 14 to 17, I.Q. 71 to 105.

PROCEDURE: The subjects were equated into two groups with regard to age, I.Q., educational, socioeconomic, racial and family background. Activity-Interview group therapy was provided for the experimental group but not for the control group. Otherwise both groups participated equally in the usual program of the Training School. A battery of tests was administered to each subject before and after the group therapy period. This battery consisted of the Wechsler-Bellevue, Stanford Achievement, Maller's Personality Sketches, Haggerty-Olson-Wickman Ratings, and the Rorschach. Each group therapy session was phonographically recorded and the recordings were analyzed by 4 judges.

CONCLUSIONS: The experimental subjects showed measureable signs of greater progress toward adjustment than the matched control subjects. Specifically, after the therapy period, (1) intellectual performance as measured by the Wechsler-Bellevue was superior in the experimental group significant at the five per cent level; (2) school achievement was superior in the experimental group, significant at the one per cent level; (3) on the Haggerty-Olson-Wickman Ratings the experimental group showed greater improvement in emotional security and social maturity, not significant at the five per cent level; (4) the Rorschach indicated more progress toward adjustment in the experimental than in the control group; and (5) the phonographic recordings indicated that the experimental group experienced emotional release, gained initial insights, and advanced in emotional security and social maturity.

## VALIDATION FACTORS IN DIAGNOSTIC TESTS

10:00-11:00 AM, Thursday, Elec. Engr. 110

10:00 AM Common and unique factor patterns in normals and neurotics. JOHN F. WINNE, *VA Hospital, Northampton.*

PROBLEM: To compare, systematically, the factor loadings of certain relevant items in the Minnesota Multiphasic Personality Inventory when derived independently from responses of normals and neurotics in an attempt to discover whether these responses are organized in the same way for the two populations. The experimental hypothesis under test is: Personality organization of normals and neurotics differs only in the relative and absolute weights attaching to the same groups of factors.

SUBJECTS: 280 neurotic males and 280 normal males equated with respect to age, intelligence, education, occupation, and marital status.

PROCEDURE: Thirty items were found in the Hysteria, Hypochondriasis, and Depression scales of the MMPI which differentiated, by Chi square, between 140 neurotics and 140 normals at the 0.01% level of confidence. When combined into a scale with unit weight, these items correctly identified about two thirds of the individuals in two known groups composed of equal numbers of normals and neurotics. Intercorrelations of items and generation of factors were carried on independently for 280 neurotics and 280 normals, and the resultant factors compared by correlational techniques. An attempt was also made to label the more important factors after rotation to approximate simple structure.

RESULTS AND CONCLUSIONS: The experimental hypothesis was rejected since six factors were generated from the neurotic intercorrelations and five from the normal intercorrelations. Factors I and II, tentatively labelled Hypochondriasis and Anxiety-Depression, account for more than half of the common variance for each population. The remaining factors from each population are dissimilar and account for very little of the common variance. It is concluded that although normals and neurotics differ quantitatively with respect to the traits of Hypochondriasis and Anxiety-Depression, there are, in addition, certain unidentifiable and unique reactions which play a minor role in determining the responses of each population to a questionnaire containing symptoms of established diagnostic significance.

10:15 AM The relationship of personality traits to factors of intelligence in personality disorders. REUBEN S. HORLICK, *Walter Reed General Hospital.*

**PROBLEM:** To determine the relationships which may exist between scores on tests of intelligence and tests of personality.

**SUBJECTS:** One hundred male, white Army neuropsychiatric patients comprised of three groups as follows: 38 neurotics, 30 psychopaths and 32 schizophrenics.

**PROCEDURE:** The Wechsler-Bellevue Scale, the Rorschach Ink-Blot test, and the Minnesota Multiphasic Inventory were administered to each patient. For each patient group, coefficients of correlation, using the Pearson product-moment formula, were computed between Wechsler-Bellevue scores and certain factors of the MMPI and the Rorschach. In addition, certain MMPI scale scores were intercorrelated with scores on the Rorschach.

**RESULTS:** With the exception of a small number of significant inverse relationships, the correlations between scores on the Wechsler-Bellevue and the MMPI are generally low. No coefficients, 0.60 or higher, are obtained between scores on the Wechsler-Bellevue Scale and the Rorschach. Most of the correlations fall below the five per cent level of confidence. Likewise, insignificant correlations predominate between the MMPI and Rorschach scores.

**CONCLUSIONS:** The low order of correlations indicates that scores on the three tests used in this study are not closely related to each other, and that, therefore, the tests are measuring different aspects of personality functioning.

10:30 AM The effect of mental set and item structure upon response to a projective test. JULIAN MELTZOFF, *VA Mental Hygiene Clinic, Philadelphia.*

**PROBLEM:** To examine some of the basic assumptions of projective techniques of the sentence completion type, with particular emphasis upon the assumption of freedom from censorship.

**SUBJECTS:** 120 male undergraduates.

**PROCEDURE:** A 60 item sentence completion test containing three different types of stimuli was administered under four different conditions. The stimulus phrases were judged to be either positively toned, negatively toned, or neutral. The test conditions were designed to provide two mental sets that favored response distortion by requesting subjects to act the role of well-adjusted and emotionally disturbed individuals; a condition under which self-esteem was threatened; and one in which self-esteem threat was minimized. Responses were judged to be either suggestive of good adjustment, suggestive of poor adjustment, or non-committal. The data were treated in a factorial design.

**CONCLUSIONS:** (1) Other things being equal, the tone of the responses to a projective test of the sen-

tence completion type is a direct function of the mental set of the subject as determined essentially by test conditions. Subjects are able to manipulate responses so as to create the impression of either good or poor adjustment. Self-esteem threatened subjects respond in practically the same manner as those instructed to act well-adjusted, except for giving more non-committal responses and taking a longer time to respond. Subjects, whose self-esteem is not threatened, respond more rapidly, and give significantly more maladjusted and fewer well-adjusted responses than those whose self-esteem is threatened. (2) Other things being equal, the tone of the responses to a test of this type is a direct function of the tone of the stimuli.

Positive stimuli tend to elicit responses that are suggestive of good adjustment. Negative stimuli tend to elicit responses that are suggestive of poor adjustment. Neutral stimuli do not directly affect the tone of the responses.

10:45 AM A study of the sensitivity of the Szondi Test in the sexual and paroxysmal vectors. IRVING ARTHUR FOSBERG, *VA Hospital, New Orleans.*

**PROBLEM:** (a) Does the Szondi Test administered to patients before and after electrically induced grand mal seizures show a difference in the paroxysmal vector? (b) Does the Sex Vector scores of the Szondi Test differ when the test is administered after a sexual episode as compared with the test administered when no orgasm has taken place?

**SUBJECTS:** Control groups numbered 100 normal men and women and 100 NP patients, men and women. Experimental groups numbered 20 normal men and women and 10 NP male patients.

**PROCEDURE:** In the control groups (1) Szondi Tests were administered to 50 men and 50 women who were not NP patients and who seemed to be functioning adequately in society; and (2) Szondi Tests were administered to 50 men and 50 women who were NP patients in mental wards (majority diagnosed as paranoid schizophrenia). In the experimental groups: (1) paroxysmal study; Szondi Tests were administered to 10 male patients before they received electro-shock therapy, and again following shock. Five pre- and 5 post-shock records were obtained. (2) Sex study; twenty normal married men and women took the Szondi Test 10 times. Five of the administrations were within 12 hours of a sexual episode, and 5 were given with a time lapse of 48 hours or more since the last sexual episode.

**RESULTS:** No significant differences were found (1) on comparing the distribution of the Szondi Paroxysmal factors before and after shock; (2) between NP controls and NP experimental groups; (3) be-

tween sex vector scores of pre- and post-orgasm tests; or (4) between normal controls and normal experimental groups.

CONCLUSION: Szondi theory of decrease in selection of specific vector cards with discharge of tension in such areas is not substantiated. (Slides)

### ANXIETY AND STRESS

11:10-11:55 AM, Thursday, Elec. Engr. 110

LAWRENCE I. O'KELLY, Chairman

11:10 AM Stimulus generalization as a function of clinical anxiety. GERALD ROSENBAUM, *Wayne University*.

The present study was designed to test the hypothesis that the state inferred from manifest clinical symptoms of anxiety exhibits functionally similar motivational properties to experimentally defined anxiety states. Since a previous study had shown that experimentally induced anxiety tends to elevate gradients of generalization, similar results were predicted for clinical anxiety states. A variety of behavioral phenomena characteristic of the clinical anxiety state might then be explained in terms of the effects of increased drive upon the generalization of response tendencies.

Seventy-two male psychiatric patients and an equal number of college students were divided into high and low clinical anxiety groups by means of psychiatric ratings of the hospitalized patients and by scores on a test designed to measure manifest anxiety in the college students. These groups were subjected to one of three experimental anxiety conditions, effected by the use of two different intensities of shock and a buzzer.

Subjects were trained to make a motor reaction to a visual stimulus and then tested on other stimuli differing from the training stimulus in height. The frequency, amplitude, and latency of the responses to these generalized stimuli were employed as the measures of generalization.

The results showed that the groups having high clinical anxiety exhibited significantly more generalization than the low clinical anxiety groups under the strong shock condition. No differences were found between the two levels of clinical anxiety for either the weak shock or buzzer conditions. Markedly parallel results were obtained from the use of psychiatric ratings and from the use of the scale designed to measure manifest anxiety.

It was concluded that both clinical and experimental anxiety exhibited the energizing function of a

drive. However, it is suggested that the drive properties of clinically defined anxiety may not be activated under conditions involving little or no threat. (Slides)

11:25 AM Ameliorative effects of "counseling" upon maze performance following experimentally induced stress. DONALD S. POMEROY, *University of Illinois*.

PROBLEM: To investigate the effects of a brief counseling situation upon performance of a task which has been performed under conditions of experimentally induced stress. The underlying hypothesis was that stress would affect performance adversely, but that subsequent counseling would serve to reduce stress-produced anxiety-interference, and thus improvement in subsequent performance would presumably follow. It was also hypothesized that stress would affect level of aspiration and that counseling would modify this effect.

SUBJECTS: Sixty introductory psychology students.

PROCEDURE: Two groups of Ss performed on a stylus-maze. Originally they learned under stress conditions. Later the Ss in one group had a brief counseling session whereas Ss of the other group engaged in a simple rest activity. Subsequent performance of the two groups without conditions of stress was compared. In order to control for the possibility that the effectiveness of counseling might have been due to some factors other than anxiety-reduction, control Ss, which were run under conditions of non-stress in the initial learning, were also divided into Counseled and Rest groups. A comparison of the different Ss' level of aspiration was also made.

CONCLUSIONS: (1) Experimentally induced stress had a detrimental effect upon maze performance and level of aspiration. (2) The experimental counseling situation ameliorated the detrimental effects of the stress. (3) The improvement of performance in all groups was in part related to the amount of practice obtained during the initial learning. (4) The greater improvement of performance in the Stress-Counseled group as compared with the Stress-Rest group was in part attributable to the elimination of anxiety which elicited responses incompatible with those required for successful performance. (Slides)

11:40 AM The possibility of antisocial uses of hypnosis. PAUL C. YOUNG, *Louisiana State University*.

PROBLEM: To formulate and carry out an experiment to determine whether it is possible to induce anti-

social behavior in hypnosis. The problem's present status is brought into sharp relief by means of (a) the common-sense definition of antisocial behavior (judgments of unhypnotized observers thus becoming the criteria of validity); (b) critical evaluation of general hypnotic phenomena and theories; (c) critique of supposedly negative researches (particularly Erickson's, with its untenable definition of antisocial behavior as consciously immoral behavior, its resultant faulty experimental design, and Erickson's misinterpretation of the results); and (d) review of successful experiments.

**SUBJECTS:** Eight uniformly somnambulistic subjects were used: residue of classroom experiments, of intensive tests in smaller groups for those thus selected, with individual training of the survivors.

**PROCEDURE:** Rowland's technique, using invisible glass protecting subjects and experimenter, was refined as follows: (a) subjects were conditioned to reach through the aperture, where, later, the dangerous objects appeared; (b) the glass was removed in half the trials, subjects actually handling snakes and "nitric acid"; (c) in case (b) substitution of methylene blue solution agitated by droplets of barium peroxide was made for nitric acid, but the vicious looking snakes (*matrix rhombifera*) commonly mistaken for water moccasins (*agkistrodon piscivorus*) were retained; (d) finally (inadvertently), real danger was introduced through the experimenter's inability to differentiate the liquids.

**RESULTS:** Seven of 8 subjects performed actions from which they shrank in normal consciousness, actions unhypnotized persons refused to contemplate.

**CONCLUSIONS:** The nature of both hypnotic phenomena and hypnotic theories leads logically to the conclusion that with energetic use of a varied hypnotic methodology, antisocial behavior may be induced. This conclusion is confirmed by successful experiments, including those reported here. Reputedly negative reports, particularly Erickson's, actually strengthen the hypothesis.

#### **SYMPOSIUM: EXPERIMENTAL APPROACH TO PSYCHO- ANALYTIC THEORY**

*1:40-3:50 PM, Thursday, Auditorium*

EDWARD S. BORDIN, Chairman

Participants: JOHN ANDERSON, GERALD BLUM, SIBYLLE K. ESCALONA, ELSE FRENKEL-BRUNSWIK, JOSEPHINE R. HILGARD, DANIEL R. MILLER, ROBERT R. SEARS, and RENE A. SPITZ

#### **ROUND-TABLE DISCUSSION GROUP: PROBLEMS OF MENTAL DEFICIENCY**

*10:00 AM-12:10 PM, Friday, Sparks 316*

LLOYD N. YEPSEN, Chairman

Participants: JOHN N. BUCK, EDGAR A. DOLL, JOSEPH JASTAK, FREDERICK THORNE, and HELEN THOMPSON

#### **ROUND-TABLE DISCUSSION GROUP: APPLICATION OF PSYCHOANA- LYTIC THEORY TO PSYCHO- LOGICAL RESEARCH**

*10:00 AM-12:10 PM, Friday, Sparks 121*

BRUNO BETTELHEIM, Chairman

Participants: SIBYLLE K. ESCALONA, ROBERT HOLT, O. HOBART MOWRER, DAVID RAPAPORT, MILTON WEXLER, and FREDERICK WYATT

#### **DEMONSTRATION: WAYS OF HANDLING TRANSFERENCE ATTITUDES IN CLIENT-CENTERED COUNSELING**

*10:00 AM-12:10 PM, Friday, Carnegie 3*

GERARD HAIGH, Chairman

Participants: OLIVER H. BOWN and EUGENE R. STREICH

#### **ROUND-TABLE DISCUSSION GROUP: CLINICAL AND RESEARCH USE OF THE "BLACKY PICTURES"**

*10:00 AM-12:10 PM, Friday, Sparks 10*

GERALD S. BLUM, Chairman

Participants: ABRAHAM CARP, HOWARD F. HUNT, FRANCES MERCHANT, and HAROLD L. RAUSH

#### **SYMPOSIUM: PROBLEMS IN THE USE OF PSYCHOLOGICAL TESTING IN RELATION TO THERAPY**

*1:40-3:50 PM, Friday, Auditorium*

MAX L. HUTT, Chairman

Participants: CAMILLA M. ANDERSON, SAMUEL KUTASH, MORTIMER M. MEYER, CHARL RHODE, and LAWRENCE S. ROGERS

## DIVISION OF CONSULTING PSYCHOLOGY

## SYMPOSIUM: INSTALLING SELECTION PROGRAMS

1:40-3:50 PM, Wednesday, Carnegie 3

(Co-sponsored with Division 14. See Division 14's program.)

## BUSINESS MEETING

5:00-6:00 PM, Wednesday, Carnegie 3

## SYMPOSIUM: COUNSELING IN INDUSTRY

2:50-5:00 PM, Friday, Elec. Engr. 110

(Co-sponsored with Division 14. See Division 14's program.)

## DIVISION OF INDUSTRIAL AND BUSINESS PSYCHOLOGY

## SYMPOSIUM: PROBLEMS OF COMMUNICATION IN INDUSTRY

1:40-3:50 PM, Monday, Little Theatre

C. G. BROWNE, Chairman

Participants: EDWARD T. RANEY, CARL I. HOVLAND, EUGENE H. JACOBSON, and PAUL FIGORS

## DEVELOPMENT AND EVALUATION OF METHODS FOR APPRAISING EMPLOYEES I

8:50-9:50 AM, Wednesday, Carnegie 3

ALEXANDER G. WESMAN, Chairman

8:50 AM Methods for the appraisal of sales personnel: a factorial approach to the analysis of criterion and predictor variates. CARL H. RUSH, JR., *Wayne University* (Sponsor, Roger Bel-lows).

This paper summarizes results of a statistical analysis of criteria of success of salesmen. It is part of a long-range sales personnel research study in development and appraisal of criterion and selection techniques.

Subjects in the experimental sample were 100 salesmen from 24 branch offices of a large Detroit firm. An attempt was made to control length of service by using as subjects men who were employed at approximately the same time. Sales performance records (4 variates), merit ratings (11 variates), personal data (7 variates), and experimental test data (12 variates) comprised the data used for the study.

A factor analysis was conducted using a matrix of the 34 criterion and predictor variates. Factors which emerged are believed to furnish insight into the nature of sales success. The variates with highest loadings were statistically weighted and combined into a composite criterion by use of three separate methods

developed by Edgerton-Kolbe, Horst, and by Hoteling. These methods were compared, and one selected which seemed to meet the conditions of this study.

Validity coefficients were obtained between the predictors and the composite criterion. These and multiple correlations obtained are discussed in light of results of the factor analysis. The results may have implications for needed development of criteria of sales success in other situations.

9:05 AM A selection study for correspondence clerks. PHILIP H. KRIEDT, *Prudential Insurance Company*.

PROBLEM: To develop a test battery to be used in selecting correspondence clerks in a large insurance company. These clerks are specialists who conduct the bulk of the company's correspondence both with policy-holders and with field agents.

SUBJECTS: Two hundred clerks assigned to 20 different correspondence sections in the home office.

PROCEDURE: A variety of criterion data was secured including a new type of "assignment rating." As predictor variables, five regular company tests and a specially constructed test of correspondence judgment were used. A major problem in analyzing these data was that of how to combine criterion scores secured for 20 different groups of clerks.

RESULTS: The implications of the various multiple correlations and regression equations secured will be discussed.

9:20 AM A study of abilities in a variety of clerical jobs. FRANK J. HOLMES, *Illinois Wesleyan University*.

PROBLEM: To study the relationship of measures of verbal, numerical and perceptual speed factors to jobs of a supervisory, interpretative, skilled, routine, and stenographic nature in a large insurance company.

SUBJECTS: 500 male and female employees in jobs classified as: superintendent, operating supervisor, senior and junior underwriter, stenographer, typist,

clerk-typist, and keypunch operator. All persons were employed in the home office of a large insurance company.

**PROCEDURE:** Tests were administered to groups of subjects. Tests measured verbal ability, number ability, perceptual speed, general information, typing, and shorthand speed. Workers were rated by management. Test results and ratings were compared to discover which abilities distinguished between upper 50 and lower 50 percent of people for each job rated. Profiles for upper and lower groups were prepared for each job. Results on each measure were compared by jobs, and differences in the significant abilities required by distinct jobs were determined.

**RESULTS:** Abilities which distinguished high-rated supervisory personnel were verbal and number ability, perceptual speed, and general information. Secretaries and stenographers were distinguished by verbal ability, general information, typing speed, and shorthand speed. Typists were distinguished by perceptual speed and typing speed. Interpretative workers showed marked ability in verbal and number abilities. Skilled punch card operators showed good verbal ability, number ability, and perceptual speed. Clerks were distinguished by verbal and number ability. With the exception of secretaries, stenographers, and typists, number ability most clearly distinguished between jobs at different levels; and scores in this factor showed a clearcut hierarchy.

9:35 AM Prediction of success in an automotive mechanic's course using the army classification battery. EDMUND F. FUCHS and ROBERT S. TIEMANN, *Personnel Research Section, AGO.*

**PROBLEM:** To determine the effectiveness of the tests in the Army Classification Battery as predictors of success in the Automotive Mechanic's Course at the Transportation School, Ft. Eustis, Va.

**SUBJECTS:** The population consisted of 352 students in the automotive mechanic's course during the period, 11 April 1949 to 20 October 1949.

**PROCEDURE:** The first six classes ( $N = 198$ ) were grouped together in one sample, and the next six classes ( $N = 154$ ) were grouped together in another sample. All scores of the ten tests of the Army Classification Battery and final course grades were collected. Intercorrelations were computed. The Wherry-Gaylord test selection technique was used to extract the best set of three tests using positive integral weights.

**RESULTS:** The best single predictor of course grades in both samples was the Army's Automotive Information Test with uncorrected validity coefficients of 0.62 and 0.53 respectively on the two samples.

## DEVELOPMENT AND EVALUATION OF METHODS FOR APPRAISING EMPLOYEES II

10:00-11:00 AM, Wednesday, Carnegie 3

ROGER BELLOWES, Chairman

10:00 AM A description of the Cox S-R Test: a projective technique for evaluating supervisory personnel in industry. KENNETH J. COX, *Hamilton, Ontario.*

This test had its origin in the suggestion of a foreman on taking the Rosenzweig P-F Study (Adult Form) that better results might be obtained industrially if a test were developed which described a number of industrial situations, involving foremen reactions. To this end, a test was developed which consists of 24 situations covering such industrial situations as the breaking of equipment, the joining of a union, being late for work, turning in poor work, throwing waste, etc. Each situation was described in three cartoons, in which the superintendent commented to the foreman about a certain situation involving a given worker known as "Bill" throughout the test. The shop steward also commented about the situation to the foreman; and, likewise, the worker commented directly or indirectly about the situation. In each case a blank block is left where the foreman's responses may be written in by the testee. These responses were evaluated using Murray's personality variables. When the test was given to a group of foremen in one factory, and the foremen were rated as to effectiveness in dealing with employee situations, psychologically meaningful differences between the "high raters" and the "low raters" were found in terms of this particular plan. Likewise, psychologically meaningful personality "miniatures" that seemed to describe the foreman evaluated could be drawn up. (Slides)

10:15 AM Making a personal adaptability test. GUY E. BUCKINGHAM, *Allegheny College.*

**SUBJECTS:** 200 male salaried industrial employees.

**ASSUMPTIONS:** Learning to adapt in personal situations doesn't differ from other learning, in kind of psychological functioning. Social approval or disapproval sets up pre-fear and post-shame in learning situations. Prefear and post-shame differ in degree, not in kind. Each organism has achieved personal adaptability by the cumulative interaction of his tissue and environment. It is possible to communicate by language with most human organisms not in an advanced state of deterioration.

**CRITERION:** The extent to which an organism reacts to outside irritating stimuli is measured in terms of

his rank in "botheredness," his rank in "mental malfunctioning," his rank in "physiological malfunctioning," and the total of "botheredness," "mental malfunctioning," and "physiological malfunctioning." Present ability to handle annoying stimuli without functional friction, while managing thinking, feeling, acting and believing simultaneously, is the CRITERION.

CONSTRUCTION: Items were selected as categorized by the early home, alley, church, school, present home, and job situations. Two hundred fifty items were tried out. The Davis item discrimination method and Fisher's  $z$  test for significance of  $r$  were used.

"Botheredness" was correlated with itself, "mental malfunctioning" and "physiological malfunctioning." "Mental malfunctioning" was correlated with itself and "physiological malfunctioning." "Physiological malfunctioning" was correlated with itself.

RESULTS: A total of 83 internally well correlated items remained. Some 62 items on "botheredness" had individual correlations with the total score on "botheredness" at significance levels of 0.10 or better.

CONCLUSION: Generalized tension exists and can be measured. The hypothesis is advanced that not having learned "how" to react to outside stimuli as determined by one's cultural value standards, and in terms of thinking, feeling, acting and believing satisfying to one's self is causal. A low amount of generalized tension indicates the organism has high personal adaptability.

10:30 AM Predicting promotion potential on the basis of psychological tests. STANLEY G. DULSKY, *Chicago Psychological Institute.*

PROBLEM: To determine if an employee's potential for promotion can be predicted on the basis of psychological tests.

SUBJECTS: 14 factory supervisors with a mean of 14 years of company service, and a mean of 5 years' tenure in their present positions.

PROCEDURE: The criterion of promotion potential was the pooled rankings of the factory personnel manager, the works manager, and the assistant works manager. The "prediction" of promotion potential was made from pooled rankings by two psychologists (the author and his associate) from a "blind" analysis of five tests including the Rorschach. Correlation between the criterion and the prediction was computed.

RESULTS AND CONCLUSIONS: The correlation between the criterion and the prediction was 0.60. It is concluded that psychological tests may be used to good advantage in determining the promotion potential of employees. The Rorschach test, properly interpreted, is of great value in personnel evaluation.

10:45 AM The perception factor in industrial testing. JOSEPH E. KING, *Industrial Psychology, Inc.*

PROBLEM: The perception factor is the aptitude to see details quickly, to recognize likenesses and differences rapidly. It was measured in these studies by the Perception (verbal) and Precision (non-verbal) tests in the Factored Aptitude Series. The problem was to study the presence of perceptual-speed in various business and industrial jobs.

SUBJECTS: Data have been gathered from various companies, including the Elgin National Watch Company (about 2000 cases), American-Associated Insurance Companies (4000 cases), Montgomery Ward (1000 cases), and various other companies.

PROCEDURE: These data were analyzed for validities, mean scores and other pertinent statistics. The analysis was carried out by specific job class. Criteria included production data, supervisory rating, turnover, and other standards of job success-failure.

RESULTS OR CONCLUSIONS: The perception factor is an important aptitude in business and industrial testing. It is definitely correlated with job success in the clerical and mechanical job families. In the technical, sales, and supervisory job families, it depends on the type of assignments the personnel perform.

#### DEVELOPMENT AND EVALUATION OF METHODS FOR APPRAISING EMPLOYEES III

11:10 AM-12:10 PM, Wednesday, Carnegie 3

REIGN H. BITTNER, Chairman

11:10 AM The performance record: an objective merit-rating procedure for industry. ROBERT B. MILLER, *Washington and Jefferson College*, and JOHN C. FLANAGAN, *The American Institute for Research.*

An objective merit-rating method has been developed for industrial hourly-wage employees by the use of the Critical Incident Procedure. This is the first application of this procedure to the industrial field. The requirements of the merit-rating plan were—besides practicality—objectivity and validity. The procedure is based on the fundamental principle that the foreman's function is to assist and develop his employees.

First, the critical job requirements were obtained of the plant under study. A small group of foremen were trained to interview the other 450 foremen to get observations of (a) unusually effective, and (b) unusually ineffective on-the-job behaviors. From 2500 to 3000 such incidents about skilled, semi-skilled, and general employees, 33 behavior categories or items were developed.

Next, these items were assembled into the *Performance Record*, a procedure for obtaining a cumulative observation record of critical performances. The foreman makes dated entries of *unusually* effective or ineffective behavior on this form, usually within 24 hours of the time of observation. Tryout studies showed that the average foreman could keep such objective records on all 30 employees for a total expenditure of 2-4 minutes per day. Tryout studies also demonstrated that when incidents were recorded only weekly or biweekly rather than daily, frequency dropped rapidly toward zero, due to forgetting. This finding suggests that summary ratings over six-month periods without such a Performance Record of incidence must necessarily be highly subjective.

The final step was a *Performance Report Form* which, with minimum subjectivity by foremen, translates observations over a six-month period into three-point reporting categories on each of the 33 items for each employee.

Principal advantages for the entire method consist of objectivity, economy, flexibility and self-corrective features, and ease in use. Directions for further research are specified.

11:25 AM Relationship between check-list and machine recordings of the Interaction Chronograph Interview. L. HAROLD SHARP and THOMAS J. HOUSTON, *Personnel Research Section, AGO.*

**BACKGROUND:** The Interaction Chronograph is an electrical recording machine used by E. D. Chapple Co. with a standard interview. It is designed to facilitate the rapid quantification of numerous aspects of social interaction in the interview. Ten scores are recorded by the Interaction Chronograph, each such score being a compound of scores on two or more component variables. The machine does not record scores on these components separately, and there was no means available prior to this study for obtaining most such scores.

**PROBLEM:** To develop a more analytical instrument than the Interaction Chronograph which will at the same time be more practicable and more economical.

**POPULATION:** Ninety-six applicants to Potential Leaders School at Fort Jackson—the total applicant group for six successive classes.

**PROCEDURE:** The variables for which scores are recorded by the machine were analyzed into their components. A procedure was then devised for obtaining scores on these components from the machine records. (This procedure is too laborious to be practicable under most circumstances.) Items comparable to these component variables were put into a Check-list which was used with stop clocks.

The Check-list procedure and the Interaction Chronograph were used simultaneously by independent

observers in recording the behavior of each subject in the standard interview.

Correlations were computed between scores on comparable variables of the two procedures.

**RESULTS:** Correlations between scores on variables measured independently by the two procedures show that the Check-list gives results substantially equivalent to those of the Interaction Chronograph at greatly reduced costs. With one exception, correlations were 0.90 or higher. A principal advantage of the Check-list procedure is that it will permit optimal combination of scores on the component variables.

11:40 AM Job analysis in terms of testable elements.

RALPH F. WAGNER, *American Institute for Research.*

**PROBLEM:** To develop a job analysis procedure aimed at providing objective information regarding weights to be given the tests in a classification battery, and to test the feasibility of using persons with only elementary training in personnel procedures to collect the job analysis data.

**SUBJECTS:** Two job analysis teams, each consisting of three enlisted airmen and one officer, interviewed 887 aircrew members and collected a total of 9,566 critical incidents.

**PROCEDURE:** In developing the procedure, a preliminary group of approximately 2,000 critical incidents concerning the job performance of aircrew members was collected. An analysis of these incidents, plus a study of aircrew job descriptions and information on available tests, indicated that 24 "job elements" could be defined which would cover all the critical behaviors involved in performing the duties of an aircrew member. Independence, homogeneity and predictability were important objectives in defining the group of job elements. To define the elements explicitly and to permit the use of tally marks in recording the frequency of critical behaviors of each kind, a list of related categories of critical behaviors was provided under each element. Following a brief course of training on the procedure, two interviewing teams, working independently at different Air Force bases, collected critical incidents concerning three representative aircrew jobs and classified them under the appropriate job element.

**RESULTS AND CONCLUSIONS:** 1. Results obtained by the two teams were very similar. 2. The relative number of incidents falling into the various elements gave a distinctive pattern of requirements for each job. 3. If the importance of a given element is reflected by the number of critical incidents classified under that element when the job is studied, applicants can be selected by weighing tests corresponding to the elements in accordance with the job analysis findings, pending the availability of empirical validation data.

11:55 AM Effect of number and order of ratings on reliability and validity. E. KENNETH KARCHER, JR., and SAMUEL H. KING, *Personnel Research Section, AGO.*

**PROBLEM:** To test under controlled conditions, the effect of order of ratings and increase in number of ratings on the reliability and validity of the Officer Efficiency Report WD AGO Form 67-1.

**POPULATION:** 289 first classmen (seniors) of the class of 1949 at The United States Military Academy.

**PROCEDURE AND RESULTS:** Associate rating groups of first classmen at West Point were formed by company with the ratees designated for each rater. Each individual in the group rated four associates and, in turn, was rated by four associates on the efficiency report. Each ratee received one rating made first by one rater, one rating made second by another rater, one third, and one fourth. Each rater completed all four ratings during one two-hour session.

Reliability estimates of part scores and composite score of the Efficiency Report were computed for each of the four orders of rating. The reliability estimate for a single rating was low, but when based on the average of the four ratings, it rose to 0.74. The last made was slightly less reliable than the other three, and the first rating was the most reliable.

Validity for predicting the official cadet Aptitude for Service Rating (a rating of officer potential) was 0.60 for the first rating, 0.48 for the fourth, and 0.72 for the sum of the four ratings.

**CONCLUSIONS:** The first rating was consistently most reliable and valid and the fourth rating made in a single session was consistently least reliable and valid of the four ratings. There was a sizeable increase in reliability estimate for four ratings over the reliability estimate of any single rating. There was a sizeable increase in the validity estimate based on the sum of four ratings over that of the first.

#### **SYMPOSIUM: INSTALLING SELECTION TESTING PROGRAMS: PACKAGE OR CUSTOM JOB**

1:40-3:50 PM, *Wednesday, Carnegie 3*

(Co-sponsored with Division 13)

GEORGE K. BENNETT, Chairman

Participants: HYMAN BRANDT, JOSEPH E. KING, JOHN C. FLANAGAN, and ROBERT G. BERNREUTER

#### **BUSINESS MEETING**

4:00-5:00 PM, *Wednesday, Carnegie 3*

CARROLL L. SHARTLE, President

#### **DINNER AND SYMPOSIUM: INTER-DISCIPLINARY RESEARCH IN EMPLOYEE-MANAGEMENT RELATIONS**

6:00-8:00 PM, *Wednesday, Nittany Lion Inn*

(Co-sponsored with SPSSI. See SPSSI's program.)

#### **FACTORS IN INDUSTRIAL EFFICIENCY I**

10:00-11:00 AM, *Thursday, Carnegie 3*

JOSEPH TIFFIN, Chairman

10:00 AM The effect of corrective lenses fitted at working distance upon the productive efficiency of hosiery loopers. DANNIE J. MOFFIE and HOWARD C. OLSON, *North Carolina State College.*

**PROBLEM:** To determine the effect of corrective lenses fitted at working distance upon the productive efficiency of hosiery loopers in a textile mill.

**SUBJECTS:** Subjects in this study are 68 women hosiery loopers.

**PROCEDURE:** Subjects were divided into two equal groups of 34 persons, and the groups were equated according to production and gauge of the looping machine. The Ortho-Rater, Keystone O. V. S. Telebinocular 46A, and the Sight-Screener were administered to both groups. Refractive examinations were also given to both groups by optometrists. The experimental group only was fitted with lenses in the first phase of the experiment. Prescriptions were based on a visual analysis of the looping process which was provided by a trained industrial engineer. In the second phase of the experiment, both groups wore corrective lenses. Each phase of the experiment lasted approximately four months. Loopers were told that it would be necessary for them to wear glasses at all times during the working spell. Work conditions were kept constant. Criterion constituted number of hose looped per hour. Corrections for pairings were made in the computation of critical ratios.

**RESULTS:** Statistical analyses indicate slight trends in favor of the experimental group for the first phase of the experiment. In no case, however, did the ratios approach the five per cent level of significance. Interviews with subjects indicated less headaches, eyestrain, and fatigue resulted from the use of corrective lenses. These subjective responses were given by both groups in the second phase of the experiment.

**CONCLUSIONS:** This experiment has provided evidence to the effect that corrective lenses fitted at working distance for hosiery loopers will pay off in increased production. Gains, however, are not as great as may be anticipated. Experiment also indicates that workers are operating under less strain when they are

visually adapted for the job through the use of corrective lenses.

**10:15 AM** The relationship between audiometric findings and certain personal factors of workers in a North Carolina textile mill. CHARLES C. MITCHELL, *North Carolina State College*.

**PROBLEM:** (1) To investigate the relationships between hearing loss and certain personal factors of workers in one department of a textile mill in which the noise level (105 decibels) is conceded by certain authorities to be dangerous to human hearing. (2) To investigate the relationships between hearing loss in each ear at four different frequencies tested.

**SUBJECTS:** Forty-seven male and female textile workers, divided into two groups, one of 32 subjects and the other of 15, according to type of work.

**PROCEDURE:** Two groups were set up, one group of 32 workers who were constantly exposed to a dangerous noise level throughout the working day, and a second group of 15 workers who entered and left the danger zone many times during the day. Each worker was tested on a standard clinical audiometer, and information as to age, length of time on the job, complaints about the noise, and type of work was gathered. Appropriate statistical analyses were applied.

**RESULTS:** The relationships for both groups between hearing loss and age and length of time on the job are statistically insignificant. The relationship between hearing loss and type of work is significant at the 5% level, with those having constant exposure being less affected. Statistically significant differences are obtained for the comparison of the different frequencies, with the higher frequencies showing more hearing loss than the lower ones. No significant differences were found between loss and each ear separately.

**CONCLUSIONS:** Results would seem to indicate that intermittent exposure to a dangerous noise level is more damaging to hearing ability than is constant exposure, and there seems to be a possibility that constant exposure leads to adaptation and blocking toward noise. Results also indicate that hearing loss is greater for higher frequencies than for lower frequencies when the worker is exposed to a dangerous noise level.

**10:30 AM** The effect of measurably different lighting conditions upon card punch production. M. E. ODOROFF and KAARLO W. NASI, *Federal Security Agency*.

**PROBLEM:** To determine the effect of improved lighting on card punch production.

**SUBJECTS:** Nine female card punch operators randomly selected from 36 operators with more than

three years of experience. All operators had production records exceeding required standard hourly rates by 15 percent or more.

**PROCEDURE:** Three lighting conditions were established differing from each other in quality and quantity of illumination. Zone 1, the existing condition, averaged 28 foot-candles at the task, but excessive brightness ratios were present. Zone 2 was improved by cleaning the incandescent fixtures, by painting the reflecting surfaces of the room and by providing lighter finishes for the machines. This resulted in an increase of illumination to 38 foot-candles at the task and the provision of satisfactory brightness conditions. Zone 3 received the same treatment as Zone 2 except that fluorescent lighting fixtures were substituted, resulting in an average of 49 foot-candles at the task, with brightness ratios similar to Zone 2. The experimental arrangement used was a latin square. The nine operators were allocated to machines in such a way that operators, machines, and lighting conditions were associated in the same combination only once. The data yielded 5 independent estimates of the variance of the population.

**RESULTS:** Differences in lighting conditions have a statistically significant effect on card punch production ( $F = 4.12$ ,  $F_{5,10} = 3.17$ ,  $F_{10,10} = 5.01$ ). The differences in production due to the effect of improved lighting are, however, relatively small when compared with operator differences or differences from week to week. This suggests that increases in production might more easily be obtained by improved employee selection processes or production control methods. These will be discussed along with the concomitant effect of improved lighting on employee morale.

**10:45 AM** Changes in elemental motions of a repetitive factory operation as related to the hour of the day. NORMAN BRIERLEY HALL, JR., *Tufts College*.

The purpose of this study was to make a statistical analysis of the time of each therblig, over an extended period of time, to determine: (1) what changes occur in the time of elemental motions, (2) the relation of such changes to each other, and (3) the relation of such changes in the time of elemental motions to the daily production curves.

The standard procedure for making motion analysis was carried out in the industrial situation. Samples were made at eight intervals during the working day. The motions of the hands were divided into therbligs, and the time determined for each.

The data obtained consist of the following: (a) production records, (b) frequency of the occurrence of the use element throughout the study, (c) times of the twelve therbligs which make up the operation, and (d) correlation between therbligs.

This micro-motion study provided a means of studying the relation existing between the elemental motions in a manual operation, and made it possible to observe the changes in pattern of the elemental motions resulting from continued activity. In this constant production task, the change in pattern of the operation was not indicated in the trends of increased variability in the therbligs toward the afternoon, but rather, the ones showing significant differences were equally divided between the morning and afternoon samples. The means of morning and afternoon samples showed no significant differences.

The day-to-day variation as shown by the production records is as would be expected. The day-to-day variations of significance in the therbligs were certainly related to the fluctuations in total production. The internal relationship existing between the elements of a manual operation is shown by the correlation between the time values for pairs of therbligs. If production is to remain constant, variations in the time of individual elements require compensating changes in other elements composing the cycle. (Slides)

#### SYMPOSIUM: EMPLOYEE DISCIPLINE

10:00 AM-12:00 M, Thursday, Sparks 10

(Co-sponsored with Industrial Relations Research Association)

M. S. VITELES, Chairman

Management's Viewpoint: H. F. HOLMES, *Yellow Cab Company*

Labor's Viewpoint: PETER HENLE, *American Federation of Labor*

Arbitrator's Viewpoint: W. SIMKIN, *National Academy of Arbitrators*

Panel Members: RANDOLPH S. DRIVER, *Atlantic Refining Company*; R. N. McMURRY, *R. N. McMurry & Company*; C. M. ARENSBERG, *Barnard College*; E. LINDEMANN, *Massachusetts General Hospital*; W. H. KNOWLES, *Michigan State College*.

#### FACTORS IN INDUSTRIAL EFFICIENCY II

11:10 AM-12:10 PM, Thursday, Carnegie 3

LEONARD C. MEAD, Chairman

11:10 AM Attitudinal variations within the framework of an extended industrial training program. JOHN F. HUMES, *University of Illinois*.

PROBLEM: To determine the attitudes of certain segments of the industrial organization toward a training program now in its fifth year, in order to estimate values and possible future directions.

SUBJECTS: A total of 134 management personnel (executives, managers, foremen) of a dairy products company, and 218 employees of the same company. Twenty-two instructors of extension courses.

PROCEDURE: Executives, managers, and foremen were interviewed at various times during the five years that extension courses have been conducted for the company. Employees were given a questionnaire, and 75 check-interviews were conducted. Some instructors have been interviewed. Others have responded (in letters) to specific questions concerning the educational program.

RESULTS: A consistent approval of the program is apparent from analysis of collected data. Effective Speech and Supervisory Training are the most popular courses of the 18 which constituted the program. Courses least liked are in technical areas. A large majority (81%) feel courses help them on their jobs and are factors in gaining advancement. Respondents believe the program has benefited the company in a variety of ways. Initial reaction to the program was decidedly critical, evidently because of the rigid formality of method. A change in genre, including some practicum (for certain courses) has resulted in an attitudinal shift. Instructor reaction varies from enthusiasm to pointed criticism of the "low level of competency" of participants. Quantitative data will be presented.

CONCLUSION: Important attitudinal differences are noted among the groups investigated. In general, these attitudes are favorable to the program. Management's attitudes are influenced by the degree of practicality and the possibility of goal-accomplishment inherent in the program. Foremen and almost all the respondent employees believe courses result in self-development and improve their position in the company. All groups believe program should be continued with emphasis on human relations, personal improvement, and promotional techniques.

11:25 AM Effects on teaching a perceptual-motor skill of experimental film variables: verbalization, "how-it-works," participation, succinct treatment. NATHAN JASPEN, *The Pennsylvania State College*.

PROBLEM: The purposes of this study were to evaluate the relative effects on learning of certain content characteristics of instructional films designed to teach an assembly task, and to evaluate participation as a film utilization device.

SUBJECTS: 1971 recruits at the Great Lakes Naval Training Station.

PROCEDURE: Fifteen different versions of a sound motion picture on the assembly of the breech block of the 40mm antiaircraft gun were produced for this study by the Motion Picture and Recording Studio of

Pennsylvania State College. Each of these films was shown to comparable groups of between 106 and 144 Navy recruits who had not had previous experience with artillery weapons. Immediately after seeing a film, each subject was given a breech block to assemble, and was individually timed with a stop watch.

**RESULTS:** A preliminary analysis indicates that two orienting sequences showing how the breech block works were more effective at the beginning of the film than in the middle or at the end; that a medium level of word-rate (100 words per minute of film) was more effective than higher and lower word rates (140, 75, and 45 words per minute of film); that participation by the subjects during the film showing, as a film utilization device, was very effective for a "slow-development" film but very confusing for a "fast-development" film; and that a succinct treatment, from an extant film, was exceedingly ineffective.

This study was done with the Instructional Film Research Program under contract with the Special Devices Center, Office of Naval Research.

**11:40 AM** The curve of output as an index of boredom: an investigation of the usefulness of several proposed behavioral indices of monotony in repetitive work. **PATRICIA CAIN SMITH, Cornell University.**

**PROBLEM:** Previous investigators have indicated that workers who report feelings of monotony or boredom may be identified by characteristic ascending or U-shaped "monotony curves," greater variability of rate of work, greater frequency and duration of voluntary rest pauses, and greater frequency of talking. The major studies were performed upon British hourly-paid workers. Our problem was to determine the usefulness of these behavioral indices as criteria of monotony for a group of American piece-rate workers.

**SUBJECTS:** Two groups of eight women, operating power sewing machines on two tasks, different for each group but both light, uniform and repetitious.

**PROCEDURE:** Each group was observed continuously for one week. Records were kept of rate of production, rest pauses, interruptions, and frequency of talking. The workers' feelings of monotony were ascertained by interviews, questionnaires and daily verbal reports. (Both union and management sponsored the study and aided in securing cooperation from the workers.) At the end of the first week, behavioral indices were related to subjective reports. Observations were then terminated since conclusions concerning the practicality of the indices as criteria seemed justified.

**CONCLUSIONS:** (1) No consistent and characteristic individual work curve was found. (2) The rate of

work, and changes in rate throughout the day, were determined by the worker's concept of a proper day's work and were not observably related to feelings of boredom. (3) Talking, rest pauses, and variability of production were determined primarily by the social situation. (4) None of the proposed behavioral indices was related to reported boredom. (5) Subjective reports were the only criteria of monotony available in this situation. (Slides)

**11:55 AM** A study of industrial absenteeism. **BERNARD J. COVNER, The City College of New York.**

**PROBLEM:** To determine nature and causes of absenteeism among employees in a factory.

**SUBJECTS:** 868 non-supervisory employees in 38 different departments.

**PROCEDURE:** Attendance records covering a six-month period in 1947 were analyzed. The number of absences per month was used as the measure of absenteeism. This measure was used to offset the effect of extreme scores resulting from extended illnesses or operations when the measure is the number of days absent.

**RESULTS:** Three-fourths of the people had less than one absence per month. Those who had more than one absence per month tended to have less than two, rather than large numbers of absences. These findings, at a time when management was greatly concerned over its absenteeism, and was blaming the latter for many of its production difficulties, showed a decided tendency toward good rather than poor attendance. Several factors of a "management-centered" nature appeared to be associated with poor attendance. These factors were: size of department, departmental supervision, and nature of work. The latter included such factors as job status, skill requirements, wages, and physical aspects of the job.

#### **SYMPOSIUM: SOCIAL PSYCHOLOGICAL STUDY OF THE DECISION MAKING CONFERENCE**

**1:40-3:50 PM, Thursday, Sparks 121**

(Co-sponsored with Division 8. See Division 8's program.)

#### **SYMPOSIUM: WHAT MANAGEMENT WANTS FROM THE SOCIAL SCIENTIST**

**1:40-3:10 PM, Thursday, Sparks 10**

(Co-sponsored with SPSSI and the Industrial Relations Research Association. See SPSSI's program.)

### SYMPOSIUM: WHAT LABOR WANTS FROM THE SOCIAL SCIENTIST

3:20-5:00 PM, Thursday, Sparks 10

(Co-sponsored with SPSSI and the Industrial Relations Research Association.  
See SPSSI's program.)

### DINNER AND PRESIDENTIAL ADDRESS

6:00-8:00 PM, Thursday, Nittany Lion Inn

CARROLL L. SHARTLE, *Administrative Behavior*

### SYMPOSIUM: TRAINING ON THE GRADUATE LEVEL IN INDUSTRIAL PSYCHOLOGY

8:50-11:00 AM, Friday, Elec. Engr. 110

MILTON L. BLUM, Chairman

Participants: ROBERT Y. WALKER, JAY L. OTIS, JOSEPH TIFFIN, and ROGER M. BELLOWES

### CONTRIBUTIONS TO BUSINESS AND INDUSTRIAL PSYCHOLOGY

11:10 AM-12:10 PM, Friday, Elec. Engr. 110

EDWIN E. GHISELLI, Chairman

11:10 AM Improvement of reading ability resulting from 40 clock hours of training with individualized methods. FREDERICK L. WESTOVER, *University of Alabama*, and MURRAY LINCOLN MILLER, *Maxwell AF Base*.

PROBLEM: To determine the gain or loss in reading ability resulting from 40 clock hours of individualized training given an adult class.

SUBJECTS: Forty-three adults engaged in business and professional work who enrolled voluntarily in a reading improvement class.

PROCEDURE: Before beginning training, the students were given parts I and II of two forms of the Iowa Silent Reading Tests, advanced, new edition. They also took one form of Nelson-Denny reading test and the Wide Range Vocabulary Test. The training consisted of approximately 20 clock hours practice with an individual pacing machine, eight clock hours of tachistoscopic training with digits, and 12 clock hours of rapid reading paced by a group reading timer. Three progress tests were administered during training.

At the end of the training period, which covered 10 weeks, students were administered two new forms of the Iowa Silent Reading Tests and one new form of the Nelson-Denny reading test.

RESULTS: The following information will be reported:

(1) results of the vocabulary evaluation, with interpretation; (2) gain or loss in reading speed and comprehension as indicated by the Iowa Silent Reading Tests; (3) gain or loss in reading ability as indicated by the Nelson-Denny reading test; and (4) interpretation based upon daily work records, progress tests, and pre- and post-tests.

11:25 AM Ice cream preferences. BENJAMIN BALINSKY and MILTON L. BLUM, *City College of New York*.

PROBLEM: Do subjects prefer "French" or "Domestic" ice cream, and what is the relation of this preference to butter fat content?

SUBJECTS: 100 college students.

PROCEDURE: Each subject was asked to state his preference for one of two ice creams. In all, six pairs were served. Actually four different ice creams were used. Two were the French type but differed in butter fat, and two were the domestic type but differed in butter fat. Precautions were introduced to eliminate the possibility that preference would be determined by position or order of presentation. In addition to indicating preference, each subject was asked to qualitatively comment on the reason for the choice.

RESULTS: Based upon the subjects used, rather consistent preferences were obtained. The order of preference was (1) high butter fat French ice cream, (2) low butter fat French ice cream, (3) low butter fat domestic, and (4) high butter fat domestic. Qualitative as well as quantitative results will be presented.

11:40 AM A study of the effect of praise upon respondents' answers in a public opinion poll. JOAN L. BESSEY, *The Pennsylvania State College*. (Sponsor, Lester P. Guest)

PROBLEM: To discover the effect of praising respondents for their answers in a public opinion poll. To discover the effect of praise upon the honesty and sincerity of responses, modality of responses, number of responses to open-ended questions, number of "don't know" responses, guessing answers to questions, and influence by question bias.

SUBJECTS: Random sample of 433 adults in Clearfield, Pennsylvania.

PROCEDURE: Two forms of a questionnaire dealing with the community of Clearfield were constructed, the experimental form having written into it short phrases such as "that's a good answer," praising the respondents' answers; and the control form having transitional remarks such as "all right" written between the questions. The questions in the questionnaire were nearly all concerned with the community,

but were devised to test for the various aspects of rapport mentioned above. Twenty-nine interviewers each used the two forms of the questionnaire alternately in interviewing a random sample of the citizens of Clearfield. The responses given by praised and unpraised respondents were compared.

**CONCLUSIONS:** Praise (1) induced respondents to give more than one answer to open-ended questions to a significant degree; (2) tended to effect a decrease in the number of "don't know" responses given as the interview proceeded; (3) induced respondents to be more honest and sincere in their responses in some instances, and at least not less honest in others; (4) did not significantly influence respondents to guess in their responses to a factual question; (5) did not induce respondents to be influenced by question bias; and (6) induced respondents to give significantly more non-modal answers to some questions, and at least not significantly fewer non-modal responses to others.

11:55 AM The role of the mentally deficient in industry. HAROLD I. MICHAL-SMITH, *Princeton University*.

(Abstract exceeded 300-word limit.)

## CONTRIBUTIONS TO THE PSYCHOLOGY OF MANAGEMENT

1:40-2:40 PM, Friday, Elec. Engr. 110

BRUCE V. MOORE, Chairman

1:40 PM Development of criteria of leadership in ROTC. A. G. BAYROFF and CLAIRE TAJEN MACHLIN, *Personnel Research Section, AGO*.

**PROBLEM:** To study leadership in ROTC and to develop evaluation measures.

**POPULATION:** Advanced ROTC students ( $N = 671$ ) from seven military colleges who also attended summer camp.

**PROCEDURE:** Visits to colleges and reports of summer camp observers (1948) resulted in the following procedure:

(1) College: Students and ROTC instructors rated students they knew best on 10-point scales (spring 1949).

(2) Camp (summer 1949): (a) First week: raters instructed to observe designated students preparatory to rating them according to principles in a specially prepared Rater's Guide. (b) Third week (middle): 10-item check list and 20-point overall rating completed for each ratee. Ratee was rated by members of his unit, his officer and NCO. (c) Sixth week (end): check lists and overall rating filled out again.

(3) Intercorrelations were computed among the following: (a) mean ratings at college, by fellow

students; (b) mean ratings at college, by instructors; (c) number of student raters at college; (d) mean overall rating at end of camp, by fellow students; (e) mean overall rating at end of camp, by officers and NCO's; (f) number of student raters at camp. Check list scores were omitted because of high correlation with overall ratings ( $r = 0.86$ ).

**RESULTS AND CONCLUSIONS:** High intercorrelations were found among ratings at college by fellow students, and instructors, and those ratings made at the end of camp by fellow students. These variables correlated lower with ratings at the end of camp by officers and NCO's. The number of student raters at college showed low but significant correlation with mean ratings. The number of student raters at camp showed zero correlation with mean ratings. Weights of the criterion elements were determined in a subsequent validation study.

1:55 PM Toward a psychology of industrial conflict: III. Aggression. ROSS STAGNER, *University of Illinois*.

The hypothesis is proposed that industrial relations will be more conflictful in those plants or departments in which hostility is focused by managers on unions and by union officials on managers. The technique employed is chiefly that of a modification of Rosenzweig's Picture Frustration Study. 24 pictures were used, 15 showing frustrating situations common in industrial relations, the other 9 being adapted from Rosenzweig or from Brown's modification. Interviews and other devices were also employed.

Subjects were 37 industrial executives, mostly personnel managers and production supervisors, and 53 union officials, including field representatives, local officers and shop stewards. Scoring of the PF test was in terms of Rosenzweig's categories; and also for total aggression and aggression focused on the opposed economic group.

The results indicate that aggression is a common reaction to frustration in an industrial situation, but that it was not revealed in many of the test situations by some of the persons studied. We suspect that much of this negative finding must be related to training, both by industry and by unions, to encourage a fact-minded, problem-centered approach to these matters, as contrasted with an emotional, hostile attitude. It seems plausible, although our inability to do individual follow-up interviews leaves this unproven, that many people wrote down the officially approved answer, not that which correctly reflected their inner processes.

Despite this defect, the test revealed a high degree of hostility by some persons on both sides, and a high degree of defensiveness which often suggested latent aggression. In general, union officers show more ex-

trapunitive aggression than managers, and international union representatives show more than local officials. Managers show a higher proportion of "harmonizing" responses. Detailed analysis will be given of responses to specific situations and of relationships between groups of subjects.

The data indicate some relation between the incidence of these characteristics and the kind of union-management relationship present in the particular industrial establishments studied. (Slides)

2:10 PM Differential concepts of leadership and their function in an industrial organization. CHARLES W. NELSON, *University of Chicago*.  
(Abstract exceeded 300-word limit.)

2:25 PM A "tailor-made" supervisory improvement program. LAWRENCE G. LINDAHL, *The Todd Company, Inc.*

PROBLEM: To determine supervisory improvement needs, build an improvement program, administer it, and check results.

SUBJECTS: Seventy-four printing, machine, and office supervisors.

PROCEDURE: Job rating sheets resulting from a job evaluation of the supervisors' job were analyzed to obtain the requirements of a composite supervisory job. A survey check sheet was made up based on the composite supervisory job and given to the supervisors themselves. The results of this survey check sheet provided a composite of needs of the individual supervisor.

It was found that 86 per cent of the supervisors

wanted to know how to improve their personality, 83 per cent wanted to know how to improve their oral and written expression, and 81 per cent wanted to know how to improve methods on the job.

The first series of 12 improvement sessions was based on "How to Improve Supervisory Personality." Meetings were held once a month and lasted about one and one-half hours.

In studying personality the sessions were made as objective as possible. A personality inventory was administered to each supervisor. Using the inventory results from the group, a profile of the typical supervisor was made. Then each supervisor could compare his individual profile with that of the typical supervisor. All of the sessions were designed to show the supervisors how to improve their supervisory personalities.

RESULTS OR CONCLUSIONS: Supervisors learned to understand themselves and, in turn, to understand others with whom they work. The individual check sheets administered after each session indicated self-improvement, personnel mindedness, and professional attitudes toward the supervisory job.

### SYMPOSIUM: COUNSELING IN INDUSTRY

2:50-5:00 PM, Friday, Elec. Engr. 110

(Co-sponsored with Divisions 13 and 17)

EDWIN R. HENRY, Chairman

Participants: ROBERT N. McMURRY, J. ELLIOTT JANNEY, ROBERT L. B. ROSSELLE, and MATT LYNKAUGH

## DIVISION OF EDUCATIONAL PSYCHOLOGY

### JOINT COMMITTEE ON RELATIONSHIPS WITH DIVISION OF EDUCATIONAL PSYCHOLOGY

9:00 PM, Monday, Willard 108

(Co-sponsored with Divisions 5, 7, 12, 15, 16, 17, and 20)

VICTOR H. NOLL, Chairman

### THE VISUALLY HANDICAPPED

10:00-11:00 AM, Tuesday, Little Theatre

(Co-sponsored with Division 16)

WILMA DONAHUE, Chairman

10:00 AM The use of tests in the educational and vocational guidance of the blind. SAMUEL P.

HAYES, *Perkins Institution and Massachusetts School for the Blind*.

For more than 30 years tests of intelligence and school achievement have been used with blind children, mostly in residential schools. Measurements at entrance and periodically hereafter with various adaptations of the Binet tests and with both forms of the Wechsler-Bellevue have determined the admission or rejection of applicants, assisted in problems of promotion and motivation, helped to decide the appropriate proportions of academic and manual work, and contributed to vocational guidance. Achievement tests from the fourth grade upward have indicated the progress of individual pupils, given comparisons of individuals with their grades, and furnished comparisons of grades with the norms for the seeing. A small battery of tests of motor skills, an interest inventory, an adaptation of the Scholastic Aptitude

Test, and a few personality tests have been successfully used with high school pupils.

The complexity of the population in a school for the blind with wide differences in amount of vision, age at onset of loss, years of school experience, facility in the use of braille, emotional adjustment to the handicap, and attitudes developed as a result of inadequate home environment are described. The modifications in technique and changes in content made necessary by the lack of vision are also described. Summaries of results on charts and tables will be put on exhibit along with samples of all test materials used. A manual for testers of blind subjects will soon be published by the National Psychological Research Council for the Blind. It will give a background for the understanding of the visually handicapped, and details for giving a selection of tests found suitable for children and adults.

**10:15 AM** Personality problems of the blind and visually handicapped as revealed by a projective technique. DONALD BRIELAND, *University of Minnesota*.

**PROBLEMS:** Do the blind and visually handicapped reveal personality difficulties on a projective sentence completion test? How do the handicapped compare with sighted controls? What are the educational implications of the differences?

**SUBJECTS:** 250 children enrolled in public school sight-saving classes or at the Minnesota Braille and Sight-saving School were matched with sighted controls. Included were all Minnesota pupils in grades 4-12 whose vision made special classes necessary.

**PROCEDURE:** Thirty "open-end" items concerning social adjustment, home adjustment, and family attitudes were presented in large print or in braille. Subjects wrote their answers. There was no time limit.

**RESULTS AND CONCLUSIONS:** The test was easily administered to blind and partially sighted subjects. Analysis of the data indicates increased emotionality (particularly among the partially sighted), excessive anxiety concerning family relationships, and more dissatisfaction with school achievement and activities. These results suggest the clinical value of such a technique.

**10:30 AM** The use of projective techniques in the personality evaluation of the blind. HELTON McANDREW, *VA Hospital, Richmond*.

**PROBLEM:** To better understand the effects of visual deficiency upon the personality of the individual.

**SUBJECTS:** Blind adolescents.

**PROCEDURE:** Groups of 25 deaf, 25 blind, and 25 normal children were matched for age and intelligence according to the Wechsler. They were then given

satiation, level of aspiration, and restructuring by classification tests to determine if the handicapped were more rigid than the normal. Later individual personalities were studied more extensively using the Twitchell-Allen Three-Dimensional Apperception Test and a Sentence Completion Test with the blind. **RESULTS:** (1) Relative to a single factor, such as rigidity, it is possible to say that the blind as a group differ from the normal-seeing population (are more rigid), but each blind person is not more rigid than each normal one. (2) When studying the total personality, the blind may show any of the personality variations and must be analyzed individually. (3) The Twitchell-Allen Three-Dimensional Apperception Test and Sentence Completion tests are applicable to the blind but must be interpreted cautiously.

**10:45 AM** A comparative study of personality factors in blind, other handicapped, and non-handicapped individuals. MARY K. BAUMAN, *Personnel Research Center*.

**PROBLEM:** To determine differences in broad personality pattern and certain specific attitudes between blind persons, persons having other major physical handicaps, and persons with no record of major physical handicap.

**SUBJECTS:** 300 persons approximately equally divided in the following groups: (1) clients of agencies for the blind in three states; (2) clients of general rehabilitation agencies in two states; (3) individuals examined for purposes of vocational guidance or industrial selection. Groups are equated for sex, age, educational opportunity, and level of general mental ability, although different means of measuring general ability were used with the blind and seeing groups.

**PROCEDURE:** A new personality inventory based on difficulties in client adjustment reported by rehabilitation workers was designed. After some preliminary study this was administered to the above groups. Results are compared both for certain individual responses, showing especially significant differences and for scores in 6 areas defined as: sensitivity; somatic symptoms of instability; interest and competency in social contacts; attitudes of suspicion toward others and magnification of self; feelings of inadequacy or lack of responsibility; and depression versus faith in the future.

**RESULTS:** Important group differences are demonstrated but individual records indicate that it would be dangerous to generalize from the group pattern to individual cases, which points up the importance of thorough clinical study. The personality pattern of the handicapped groups is based largely on the social and economic consequences of their handicap rather than upon the direct impact of the physical defect upon

the personality, and differs from the normal pattern in degree rather than kind.

### METHODS OF INSTRUCTION

11:10 AM-12:10 PM, Tuesday, Little Theatre

MARVIN D. GLOCK, Chairman

11:10 AM History and use of the electronic reader for the blind. WILMA T. DONAHUE, *University of Michigan*.

The Electronic Reader, a portable device which translates print into a sound pattern so that blind persons may read, will be demonstrated. Research on the device will be described, and lessons prepared for training users of the Reader will be demonstrated. (Phonograph required.)

11:25 AM A comparison of two teaching methods for use of the electronic reader with the blind.

EMILY G. WILLERMAN, *University of Michigan*.

PROBLEM: To compare the synthetic and analytic methods of teaching reading to the blind with the Electronic Reader, a device which converts printed material into auditory signals.

POPULATION: 18 blind high-school students and 15 blind adults.

PROCEDURE: Two series of lessons designed to teach the signals of the Electronic Reader were developed and recorded. *Series I* teaches by the synthetic method and presents three types of material at the rate of 15 five-letter words per minute: (1) the complete alphabet; (2) a vocabulary of 194 words; (3) phrases, sentences, and paragraphs using these words. *Series II* teaches by the analytic method and presents two types of materials at the rate of 36 five-letter words per minute: (1) a vocabulary of approximately 194 words; (2) phrases, sentences, and paragraphs which use these words. After the subjects learned the recorded series of lessons, they were tested to determine: (1) maximum rate of reading; (2) ability to read different type sizes and styles; (3) ability to operate the Reader manually.

CONCLUSIONS: Tentative conclusions based on results of the two teaching methods are: (1) adults of average intelligence can learn to make the necessary auditory discriminations for reading letters, words, and sentences; (2) subjects can read accurately at 36 words per minute, and it is possible that speed of reading can be increased to 45 words per minute; (3) after subjects have learned to read a standard type they can quickly transfer to different type sizes and styles; (4) after learning to read signals presented mechanically, transfer to manual operation of the Reader stylus can be accomplished with practice. Dif-

ferences between reading proficiency of subjects taught by *Series I* and *Series II* will be discussed.

11:40 AM The effects of attention-gaining devices on film-mediated learning. D. MORGAN NEU, *Pennsylvania State College*.

PROBLEM: To determine whether film-mediated learning can be improved through the use of attention-gaining devices.

SUBJECTS: Two separate populations were tested: (1) 1055 Naval trainees at the Great Lakes Naval Training Station, Great Lakes, Illinois. (2) 1576 Army Recruits at Fort Dix, New Jersey.

PROCEDURE: Five versions of an experimental instructional film containing identical content (the use of machine-shop measuring tools) were produced. Four of these versions contained different types of attention-gaining devices (relevant visual, relevant sound, irrelevant visual, irrelevant sound). The fifth version contained no special attention devices. Army and Navy companies were divided into comparable groups by a randomization procedure. Each group was either shown one of the films or no film at all. All film groups were given an information test on the film subject matter and a recognition test on the attention-gaining devices immediately after the film showing. The no-film groups were given the information test only.

RESULTS AND CONCLUSIONS: For both populations the following findings were consistent: (1) the films effectively taught the information intended, as measured by the test (whose K-R reliability was above 0.9). The no-film group mean was one and a half to two sigma units below the combined film group mean; (2) the basic (no attention-gaining devices) version was as effective as, or more effective than, any of the attention device versions; and (3) the data suggested that irrelevant devices may have interfered with learning.

Typical production techniques used to emphasize content (*e.g.*, *ultra* close-ups, spot-lighting, pointing) do not necessarily facilitate film-mediated learning.

This study was done under the Instructional Research Program under contract with the Special Devices Center, Office of Naval Research.

11:55 AM Preliminary evidence on permanency of reading rate increases following intensive training in a reading laboratory. THOMAS F. STATON, *Air University*.

PROBLEM: To determine whether increases in the rate of reading registered under laboratory conditions during a program of reading improvement persist when retested under similar laboratory conditions after the elapsement of a period of months.

**SUBJECTS:** Twelve Air Force Officers were located who had completed the standard Reading Improvement Laboratory Course developed and supervised by Air University, and, after a lapse of time ranging from about four months to one year, had completed another essentially similar course in reading improvement. These officers formed the population of the study.

**PROCEDURE:** Scores on reading rate and comprehension of subjects were obtained at the beginning and end of the first reading course taken. Similar scores were obtained at the beginning and end of a subsequent similar course in reading improvement. Data were analyzed for: (1) indications as to permanency of improvement registered in first reading improvement course as shown by preliminary test in second course; (2) comparative results obtained from original and subsequent taking of reading improvement course as regards speed of reading; and (3) indications of changes in comprehension rate accompanying changes in reading rate.

**RESULTS OR CONCLUSIONS:** Due to the small number of available cases which satisfy the criteria specified in the statement of problem, results must be regarded as indications rather than conclusions. (1) Marked increase in reading rate, under laboratory conditions, without significant loss in comprehension may be expected from the reading improvement course used in the study. (2) Following termination of the course, a decline in reading rate may be anticipated, but not extending to the low point marking the initial test of the original course. (3) Repetition of the course tends to result in a reading rate higher than that achieved at the end of the original course.

### THOUGHT PROCESSES

1:40-2:40 PM, Tuesday, Little Theatre

T. L. HARRIS, Chairman

1:40 PM An investigation of the Whole-Part Approach as a problem-solving process. RALPH H. GOLDNER, *Fredonia State Teachers College*.

**PROBLEM:** (1) To observe, record, and analyze problem-solving behavior in a systematic way. (2) To determine if the Whole-Part Approach (dealing with the problem as a whole or only with part of the problem) is a consistent process for individuals in a variety of problem-solving situations. (3) To determine if the Whole-Part Approach reveals differences in problem-solving behavior among a group of individuals homogeneous with respect to intelligence.

**POPULATION:** Nineteen third-year college students at the University of Chicago, homogeneous with respect to total scores on ACE Test and showing no sig-

nificant difference between Q and L scores. They were also homogeneous with respect to certain achievement test scores and age.

**PROCEDURE:** Rorschach Test, Arthur Stencil Test II, and 4 specially designed tests were administered individually. Tasks included verbal and perceptual problems ranging from unstructured to more structured situations. Problem-solving behavior was observed and recorded. Inferences as to Whole-Part process were made from recorded observations.

**RESULTS:** (1) W% in Rorschach Test and combined Whole-Part Approach scores of other tests correlated 0.66. (2) With subjects arranged as to W% in Rorschach Test and distribution divided into two halves, 42% of the other test scores in the upper half were high and 24% low, with respect to Whole-Approach, while in the lower half 18% were high and 60% were low.

**CONCLUSIONS:** Evidence indicates that the Whole-Part Approach is a consistent process for the majority of the subjects in a variety of problem-solving situations. A group of subjects homogeneous as to intelligence shows individual differences with respect to the Whole-Part Approach in problem-solving situations.

1:55 PM Study of conscious thought processes by the method of stimulated recall. B. S. BLOOM, *University of Chicago*.

Members of discussion groups are not really free to give verbal expression to all of their conscious mental activity because of amount of time available, need for protecting their own security as well as that of others, and because of difficulty in communicating their thoughts to the other members of the group. The conditions under which the group is established and organized largely determine the thoughts the individual verbalizes as well as those kept hidden. In order to study conscious thought processes, the thoughts of which the individual is aware but which he does not communicate in the group discussion, the method of stimulated recall has been developed. This method is based on the idea that when presented with a sufficient number of the cues which occurred in the original situation, a subject is able to actually relive the original situation with great vividness and accuracy. Sound-recording equipment is used to stimulate recall of the original situation. To date, the method has been used in the study of approximately thirty lectures and discussions. The protocols have been analyzed to determine the extent to which the thoughts express active thoughts clearly relevant to the on-going discussion, the extent to which the thoughts involve little more than passive listening, the nature of the diversions from

the subject of discussion, and the expressions of tension, boredom, and concern about self. Although the method has been used primarily in the study of classroom situations, it appears to be useful for the study of other social situations where the investigator is concerned about the relations between various events in the situation and the rather subtle thought processes of the participants.

2:10 PM A study of memory under conditions of stimulated recall. EUGENE L. GAIER, *University of Chicago*. (Sponsor, B. S. Bloom)

Recently, a number of studies have been conducted on the thought processes that students have in connection with their participation in classes and/or lecture groups. The data used have been the individual's reports of the conscious mental thoughts he had in the original situation, when stimulated to recall by means of listening to a play-back of the complete records of the verbal cues which occurred in the original class situation. It has been assumed in these studies that if the individual is given enough of the original material (cues from the discussion and/or lecture period), he will be stimulated to recall not only the overt behavior occurring in the class, but also his own private thoughts as well. This study was conducted with a group of students in the College of the University of Chicago. Those who participated in the discussion were randomly divided into a number of subgroups. Each subgroup was interviewed at varying time intervals after the original sessions: 1, 2, 4, 8, 16, and 32 days after the recording session. The criterion of recall in this study is the accuracy with which the individual could anticipate the verbal material following selected points on the recording. The two types of data gathered in this study were: (1) the accuracy with which the individual could anticipate verbal material following selected points on the recording; and (2) the completeness and confidence with which he could recall his thoughts about points in the discussion. Comparisons have been made of the extent and accuracy of the individual's recall *before* the use of the cues furnished by the recording (unstimulated recall) with recall *after* stimulation. Comparisons are also made of the accuracy of recall of the overt material and the confidence and completeness of the recalled thoughts.

2:25 PM Evaluating achievement in psychology. BARRY T. JENSEN, *Miami University*. (Sponsor, John Horrocks)

PROBLEM: (1) To develop techniques for measuring so-called "intangible" outcomes of instruction in ele-

mentary psychology. (2) To test the relative value of class attendance versus independent study procedures.

SUBJECTS: 115 college sophomores, 95 enrolled in an elementary psychology course, and 20 who have never taken psychology. Others used in validity studies.

PROCEDURE: Forty students enrolled in the course were excused from all requirements regarding attendance, except that necessary for taking three mid-terms and the final examination. These students were paired with controls registered in sections taught by the writer and subject to usual attendance requirements. Matching was on the basis of freshman grades and A.C.E. rankings. Fifteen of the controls were paired with students in the same course but with a different instructor. Twenty controls were paired with naive subjects. In addition to the required examinations, these students completed a battery of tests and questionnaires, most of which were developed especially for this purpose.

Analyses of data are made in terms of differences between various matched groups. Further study is aimed at discovering what, if any, areas of student growth show greater change as a result of classroom instruction or independent study. The relative performances of underachievers in the two situations are being studied also.

RESULTS: Results are not yet completely processed. It appears that, in terms of averages, many differences are not statistically significant. Item and topic analyses have not yet been completed, nor has the study of underachievers.

CONCLUSIONS: Data are as yet too incomplete to permit drawing conclusions.

## PRESIDENTIAL ADDRESS AND BUSINESS MEETING

2:50-5:00 PM, Tuesday, Little Theatre

GERTRUDE HILDRETH. *Experiential Learning in Teacher Training*

## DEVELOPMENTAL TRENDS IN SCHOOL-AGE CHILDREN

8:50-9:50 AM, Wednesday, Sparks 10

(Co-sponsored with Division 7. See Division 7's program.)

## ACADEMIC ACHIEVEMENT

10:00-11:00 AM, Wednesday, Elec. Engr. 110

N. L. GAGE, Chairman

**10:00 AM** Validity of test items for measuring learning specific to a course. JOHN S. HELMICK, *University of California at Los Angeles.*

**PROBLEM:** To determine the validity of test items in elementary psychology and in educational psychology as measurements of material learned in the given course.

**SUBJECTS:** A class of approximately 300 in general psychology and a class of approximately 200 in educational psychology. Both classes were regular session students at UCLA.

**PROCEDURE:** The procedure was the same for both classes except for the test items. At the beginning of the semester, the class was given a pretest made up of true-false and multiple choice items from previous final examinations for that course. The tests were scored and the items analyzed. At the conclusion of the semester, the same pretest items were included in the regular final examination. The pretests had not been returned to the students, and no statement had been made to indicate that the items would ever reappear on course examinations. A new item analysis was made to compare performance on the same items before taking and after taking the course.

**RESULTS:** The correlation between pretest score and final total score in the course (total of all examinations excluding pretest) was 0.34 for the elementary class, and 0.35 for the educational class. Many of the true-false items, but few of the multiple choice, were answered correctly by over 85% of the pretest group. Some of the items, including those initially difficult, showed little change in percent of students missing them from pretest to final. In general, those items on the final which correlate highly with total score tend to show satisfactory change from pretest to final, but this is not always the case. A general conclusion is that it is impossible to determine from analysis of post-test results alone, the validity of items for measuring learning specific to a course.

**10:15 AM** Reliability of college grades. EDWARD L. CLARK, *Northwestern University.*

**PROBLEM:** The purpose of this paper is to illustrate a method of determining the reliability of college grades, while comparing grades obtained on an eight-step system with those on a five-step system. The method of estimating the reliability, which appears not to have been used with grades heretofore, is to determine the ratio of the standard deviation of weighted individual averages to the standard deviation of the combined grades of all individuals.

**SUBJECTS:** About 3200 individual records from six classes of engineering students and 7 classes of liberal

arts students were studied. In 7 of these 13 groups grades were based on an eight-step system, and in the remaining six groups, the grades were based on a five-step system.

**RESULTS:** As might be anticipated on the basis of general considerations, the grades assigned on the eight-step system were more reliable than those assigned on the five-step system, but this difference was quite small. Apparently, the grades as a whole were so unreliable that little was lost by changing to a five-step system. (Pearsonian  $r$ 's between first and second term averages were usually less than 0.80.) The ratios of the standard deviation of individual averages to the standard deviation of all grades appear to be definitely more stable than  $r$ 's between first and second term averages. The ratios are a few hundredths less than the  $r$ 's between terms, but this seems desirable in view of the possibility that the  $r$ 's were inflated by the halo effect on second term grades for students continuing with the same professors.

**CONCLUSIONS:** The ratio of the standard deviation of the student averages to the standard deviation of all grades was found to be approximately the magnitude of the  $r$ 's between first and second term averages. It was rather more stable from year to year, and could be computed on only one term of work. It is recommended, therefore, as a coefficient of reliability for college grades.

**10:30 AM** Worries of veteran and nonveteran students as related to disparities between predicted and actual college grades. WILLIAM B. SCHRADER and NORMAN FREDERIKSEN, *Educational Testing Service.*

**PROBLEM:** To compare veterans and nonveterans with respect to tendencies toward worry, and to determine whether or not disparities between students' predicted grades and actual grades are related to such tendencies. **SUBJECTS:** 3,132 veterans and 2,299 nonveterans in twelve colleges, who entered as freshmen in 1946.

**PROCEDURE:** For each subject, a measure of "over-achievement" was computed on the basis of usual regression methods; this measure, called, *Adjusted Average Grade* in this study, expresses the difference between a student's predicted and actual, freshman average grade. Worries were reported on a questionnaire near the end of the freshman year. For each college, the proportion giving each questionnaire response and mean Adjusted Average Grade were determined for veteran and nonveteran students. Differences were evaluated by appropriate significance tests.

**RESULTS:** About one student in five, in the typical group, said he frequently felt worried or upset. Of

the topics listed, inability to concentrate was most frequently reported. Veterans were slightly more likely to be concerned about this problem than were nonveterans. Veterans were more subject than nonveterans to financial worries; nonveterans were more prone to worry about inferiority feelings, getting to know people socially, and selecting a course of study.

Students who reported relative freedom from worry about choosing their program tended to make superior Adjusted Average Grades. Freedom from worry about getting to know people socially was associated with *inferior* Adjusted Average Grades. As would be expected, tendencies to worry about getting accustomed to college study, inability to concentrate, and overcoming poor preparation were associated with lower Adjusted Average Grades.

This study is part of an investigation made possible by funds granted the Educational Testing Service by the Carnegie Corporation of New York. (Slides)

10:45 AM Vocational plans of veteran and nonveteran students as related to disparities between predicted and actual college grades. NORMAN FREDRIKSEN and W. B. SCHRADER, *Educational Testing Service*.

PROBLEM: To compare veterans and nonveterans with respect to educational-vocational plans, and to determine whether or not disparities between students' predicted grades and actual grades are related to such plans.

SUBJECTS: 3,132 veterans and 2,299 nonveterans in twelve colleges, who entered as freshmen in 1946.

PROCEDURE: For each subject, a measure of "overachievement" was computed on the basis of usual regression methods; this measure, called *Adjusted Average Grade* in this study, expresses the difference between the student's predicted and actual, freshman average grade. Vocational-educational plans were reported on a questionnaire near the end of the freshman year. For each college, the proportion giving each questionnaire response and mean Adjusted Average Grade were determined for veteran and nonveteran students. Differences were evaluated by appropriate significance tests.

RESULTS: The reason for attending college most often given by nonveterans was to get necessary training for entering a profession; veterans more often said they wished to prepare for a better-paying job. Differences between veterans and nonveterans with respect to specific vocational plans were slight. About 20 per cent of both groups were not at all sure what kind of work they would do. Nonveterans tended to attach greater importance to college graduation and grades than veterans. Veterans far more often than

nonveterans planned to accelerate their college program.

Those students tended to earn high Adjusted Average Grades who went to college for professional training or for "general knowledge," who planned to enter a profession requiring graduate training, who were certain of their vocational choice, and who considered college graduation and grades important.

This study is part of an investigation made possible by funds granted the Educational Testing Service by the Carnegie Corporation of New York. (Slides)

### SYMPOSIUM: USING GENERAL PSYCHOLOGY IN TEACHING EDUCATIONAL PSYCHOLOGY

1:40-3:50 PM, Wednesday, Elec. Engr. 110

(Co-sponsored with Division 2)

JOHN HORROCKS, Chairman

Participants: CLAUDE E. BUXTON, W. E. HALL, VICTOR NOLL, and LEE J. CRONBACH

### DINNER HONORING H. E. BUCHHOLZ

6:00-8:00 PM, Wednesday, State College Hotel

Speakers: W. A. BROWNELL and M. R. TRABUE

### SYMPOSIUM: SOCIAL INTERACTION IN THE CLASSROOM

8:50-11:00 AM, Thursday, Auditorium

(Co-sponsored with Division 7)

ALVIN ZANDER, Chairman

Participants: HAROLD H. ANDERSON, HERBERT F. WRIGHT, HUBERT COFFEY, URIE BRONFENBRENNER, and DAVID JENKINS

### DISCUSSION GROUP: TEACHER SELECTION AND APPRAISAL

1:40-3:50 PM, Thursday, Elec. Engr. 110

D. G. RYANS, Chairman

A meeting for interchange of information on current and projected research. All persons engaged in studying problems of teacher competence are invited to participate.

## DIVISION OF SCHOOL PSYCHOLOGISTS

## EXECUTIVE COMMITTEE MEETING

8:00-10:00 PM, Sunday, Willard 109

## CONTRIBUTIONS TO SCHOOL PSYCHOLOGY

8:50-9:35 AM, Monday, Osmond 117

MILTON A. SAFFIR, Chairman

8:50 AM A Rorschach study of high school failures.

ALBERT S. BECKHAM, *Chicago Board of Education*.

**PROBLEM:** The problem is to isolate Rorschach factors of a psychogenic nature prevalent in a group of high school failures, not apparent in degree, or kind, in other high school students. That is, to discover personality problems, conducive to failure, not present among, let us say, honor students.

**SUBJECTS:** Twenty-five high school failures of two or more semesters, compared with 25 students in the same school who are members of the National Honor Society.

**PROCEDURE:** The ten ink-blots comprising the Rorschach Psychodiagnostik were administered to 25 failures and 25 honor students.

**RESULTS AND CONCLUSIONS:** The Rorschach test is an important instrument in dealing with school problems such as failures. Failure groups have about half the number of responses. They have more than 15% W responses, mostly of poor organization. Honor students have good F% while failures do not. Failures show a high degree of stereotypy. M, the symbol of human-like action, is important here. The failures average 1.8 M per student with a range from 1 to 5; the honor students average 2.7 M per student and range from 1 to 15. The latter show a richness of inner life not experienced by the former.

Honor students possess emotional maturity far in excess of failures. Emotional maturity is important in high school success.

Rejection, or the failure to give a response to a card proved to be an important index. The honor students had only 16 per cent rejection while the failures had 47.6 per cent rejection.

9:05 AM The extent and nature of educational provisions for the gifted child. PAUL WITTY, *Northwestern University*.

**PROBLEM:** To ascertain the extent and nature of educational provisions for the gifted throughout the United States.

**SUBJECTS AND SOURCES:** (a) Several groups of pupils, of I.Q. 130 and above, who were studied genetically

in the Psycho-Educational Clinic; (b) reports in published studies of practice; and (c) answers to questionnaires sent to state departments of education, select cities and towns, and persons associated with classes for the gifted.

**PROCEDURE:** (a) Statistical analysis of the frequencies of different types of educational provisions made for three groups of gifted subjects studied throughout their elementary and high school careers. (b) Analyses of reports of state departments, administrators and teachers regarding gifted pupils. (c) Analyses of literature, to reveal the practices employed in various cities making provision for the gifted.

**RESULTS OR CONCLUSIONS:** Gifted children can and do master the academic subjects in the elementary and in the secondary school in at least one-half the time allotted to these subjects. Acceleration is the most frequently found provision for the gifted—occurring usually in the elementary grades. Enrichment assumes second place. Academic experience appears to be less satisfactory and challenging for the gifted throughout the secondary school. The provisions reported within states and cities are quite inadequate, but the following practices appear in this order: acceleration, enrichment, homogeneous grouping, honors classes, individualized instruction, clubs, and various extra-curricular activities. The practices are varied and seem to be initiated with little regard for procedures in other comparable situations, and for research concerning gifted children.

9:20 AM Some comments concerning the role of education in the "creation of creation." EDITH A. WEISSKOPF, *Purdue University*.

It is one of the main aims of education to encourage the development of creative abilities. The psychological literature contains a considerable amount of information on the conditions which enhance creative thought. Thus, one would expect educators to encourage their pupils to use techniques which are thought to create a fertile soil for the growth of new ideas. However, this is rarely the case. Passages from the literature on favorable conditions for creative insight will be quoted, and an attempt will be made to show that the mental attitude encouraged by our school system creates diametrically opposite conditions. Special emphasis will be placed on the advantage of being "inattentive" during specific phases of intellectual work, an attitude which is strongly discouraged by educators.

Among the four stages of the creative process, namely, preparation, incubation, illumination, and verification, we prepare young people for the first

and last stage only. One reason for the neglect of incubation and illumination may be the fact that these two stages appear to be directed to a higher degree by unconscious forces. It may be the denial of these forces which causes educators to deny the processes of incubation and illumination.

### **SYMPOSIUM: WHAT SCHOOLS WANT FROM THE SCHOOL PSYCHOLOGIST**

10:00 AM-12:10 PM, Monday, Osmond 117

FRANCES A. MULLEN, Chairman

Participants: CHARLES S. ROBINSON, HERMAN GROSS, HARRY J. BROWNFIELD, and CARLYLE C. RING

### **SYMPOSIUM: WHAT PSYCHIATRISTS WANT TO DO FOR SICK CHILDREN**

1:40-3:10 PM, Monday, Osmond 117

ETHEL CORNELL, Chairman

Participants: GEORGE LOTT, J. FRANKLIN ROBINSON, and JEAN A. THOMPSON

### **SYMPOSIUM: CONTRIBUTIONS OF THE SCHOOL PSYCHOLOGIST TO THE MENTAL HEALTH OF THE SCHOOL CHILD**

3:20-5:00 PM, Monday, Osmond 117

ELIZABETH L. WOODS, Chairman

Participants: MARY I. ELWOOD, SYBILLE ESCALONA, GEORGE MEYER, ELIZABETH SEEGER, JOHN L. STENQUIST, THELMA GWINN THURSTONE, and FRITZ REDL

### **BUSINESS MEETING**

5:00-6:00 PM, Monday, Osmond 117

BERTHA M. LUCKEY, President

## **DIVISION OF COUNSELING AND GUIDANCE PSYCHOLOGISTS**

### **PSYCHOTHERAPEUTIC ASPECTS OF COUNSELING**

8:50-9:50 AM, Monday, Sparks 10

EDWARD S. BORDIN, Chairman

8:50 AM Individual personality and behavior in a social group. HAROLD B. PEPINSKY, ROBIN J. CLYDE, BARBARA A. OLESEN, and NORVAL L. PIELSTICK, *State College of Washington*.

### **DINNER AND PRESIDENTIAL ADDRESS**

7:00 PM, Monday, Nittany Lion Inn

BERTHA M. LUCKEY. *Duties of a School Psychologist—Past, Present and Future*

### **ROUND-TABLE: PSYCHOLOGICAL ASPECTS OF PHYSICAL DISABILITIES**

8:50-11:00 AM, Tuesday, White Hall 105

(Co-sponsored with Division 12. See Division 12's program.)

### **THE VISUALLY HANDICAPPED**

10:00-11:00 AM, Tuesday, Little Theatre

(Co-sponsored with Division 15. See Division 15's program.)

### **SYMPOSIUM: DIAGNOSTIC TECHNIQUES FOR SPECIAL EDUCATION**

1:40-3:50 PM, Tuesday, Osmond 109

JOSEPH JASTAK, Chairman

ELOISE CASON. Academic difficulties.

EDGAR A. DOLL. Cerebral palsy and other brain damage.

WILLIAM E. HENRY. Emotional disturbances.

HELEN S. LANE. Deafness and hearing loss.

THOMAS L. McCULLOCH. Mental deficiency.

### **MEETING OF THE NEW EXECUTIVE COMMITTEE**

4:00-6:00 PM, Tuesday, Osmond 109

PROBLEM: A relevant criterion of client adjustment may be his behavior in a social group. Two measurable kinds of social behavior are: (a) choices he gives to and receives from other group members on a sociometric test, and (b) how often he participates verbally in the group. Since direct measurement of these kinds of social behavior is not economical for all clients, a personality test might provide a useful intermediate criterion. This study is an attempt to predict from

personality scores to these kinds of behavior in a social group.

**SUBJECTS:** Subjects were 30 male college freshmen who met voluntarily once a week for 1-1½ hours in a program of leadership training, during the Fall Semester, 1949. The group leader and three observers served as experimenters.

**PROCEDURE:** Personality and sociometric tests were given in the group at the end of 8 weeks and again 6 weeks later. Twenty-seven subjects participated in the assessment, consisting of the Group Rorschach (test-retest  $N = 19$ ), sociometric tests purporting to measure "acceptance" and "role" (test-retest  $N = 18$ ). Verbal participation of each member was independently recorded by the three observers in all sessions, and criterion scores were obtained in four meetings held between the first and second assessments. All test data were filed away until after the second assessment. Rorschachs were scored by two judges working independently, without knowledge of the subjects' names.

**RESULTS:** Nearly all inter-judge and inter-observer reliability coefficients were in the 0.90's. Choices given on the sociometric tests were significantly associated for the two assessments, as were choices received, indicating stability of choice behavior. Group Rorschach performance was not constant: subjects' scores tended to be more "outgoing" and less "controlled" in the second testing.

**CONCLUSIONS:** Relationships between Rorschach signs and the two measured kinds of behavior in the social group are discussed.

9:05 AM Certain factors associated with success and failure in personal adjustment counseling.

DANIEL CASNER, *Veterans Administration, New York Regional Office.*

**PROBLEM:** The purpose in this investigation is to search for factors related to the outcome of personal adjustment counseling with veterans.

**SUBJECTS:** The subjects of the study comprised the 50 most improved and the 50 least improved personal counseling cases as determined by the improvement ratings of judges who referred a total of 159 veterans for personal adjustment counseling.

**PROCEDURE:** As indices of intelligence, interests, personality and adjustment, the Bregman Revision of the Army Alpha Examination, the Kuder Preference Record, the Minnesota Multiphasic Personality Inventory and the Bell Adjustment Inventory, respectively, were administered to each consecutive referral for personal adjustment counseling, at three veterans' advisement centers. Each case was referred essentially because personal or emotional problems interfered with his successful vocational adjustment. The test results plus information, from the veteran's ad-

visement folder, pertaining to education, age, advisement status, military service, disability and marital status were sent to the investigator after personal counseling was initiated with each client.

Personal counseling interviews were conducted by the investigator who used the nondirective method. Frequency tabulations were made of all the data obtained from the test results, advisement records, and the ratings of improvement. These data permitted comparisons to be made between the successfully counseled and unsuccessfully counseled subjects.

**RESULTS:** Reliable differences were found for the following characteristics which favored the most improved or successfully counseled subjects: above-average intelligence, more than 12 years education, full-time college student, three years or more military service, marked cultural preferences as against occupationally oriented interests, age under 30, femininity personality component, and occupational maladjustment of the fully employed.

The following characteristics significantly differentiated the successes and failures of personal counseling and favored the latter group: average or below-average intelligence, less than 12 years education, unemployed, marked occupationally oriented interests, marked distaste for cultural pursuits, neuropsychiatric disability.

9:20 AM On a stimulus-response analysis of insight in psychotherapy. WILLIAM SEEMAN, *University of Minnesota.*

**PROBLEM:** To analyze that client behavior in psychotherapy which is characterized as "insight" in terms of learning theory. A stimulus-response analysis of insightful behavior may be made in terms of a non-reinforcement theory (in which case it should be explicitly stated in what respect it is like or departs from Guthrie's systematic formulations) or in reinforcement terminology (in which case it should be explicitly stated in what respect it conforms to or departs from Hullian theory). The mere employment of reinforcement terminology does not seem to guarantee that the theoretical formulations are of a reinforcement character. This may be illustrated by Franklin Shaw's paper, which, though it does employ such a terminology, can be shown actually to conform much more closely with the sign-gestalt formulation of Tolman. There is a fairly long statement on the central role which neurotic behavior plays in terms of drive reduction, and the relation this bears to the psychoanalytic concept of resistance. The relevance of the distinction between Tolman's and Hull's formulation of experimental extinction is indicated in terms of empirical findings reported by Alexander and French.

9:35 AM Some moral considerations involved in the concept of nondirective counseling. ALBERT F. GRAU, *Georgetown University*.

PROBLEM: The problem may be given a two-fold expression: (a) "Does the counselor have the right, professionally or morally, to permit a client seriously to consider psychosis or suicide as a way out, without making a positive effort to prevent these choices?"

(b) More specifically, is the nondirective approach completely compatible with religious and moral principles, so that nondirective therapy and implementations may be used in full-blown development especially by counselors who have *ex professo* the obligation to inculcate high ethical ideals?

PROCEDURE: (1) The problem is presented as it exists for a large proportion of counselors. Centering the discussion about nondirective acceptance, the writer presents considerations drawn from experience, psychology and moral theology. (2) The concept of amoral acts in relation to subjective freedom of choice and operation is analyzed; the counselor's obligation and competency are discussed in relation to influencing client choices. The dynamics of motivation are examined. (3) A synthesis of the deductions drawn from the above discussion (in 2) is presented in its application to nondirective acceptance, justifying the plausibility of nondirective acceptance in approaching the problem posed.

RESULTS OR CONCLUSIONS: Because adjustmental resources lie ultimately with the client alone, the dynamics of nondirective acceptance are better suited to the situation in which the client may possibly choose psychosis or suicide as a way of escaping his conflict.

### ADMINISTRATIVE ASPECTS OF THE COUNSELING PROGRAM

10:00-11:00 AM, Monday, Sparks 10

FRANK M. FLETCHER, JR., Chairman

10:00 AM An evaluation of the efficacy of group preparation for vocational counseling. HAROLD RICHARDSON and HENRY BOROW, *University of Minnesota*. (Sponsor, Henry Borow)

PROBLEM: The hypothesis tested was that students who receive group orientation to vocational counseling adopt a more effective role in counseling than students not receiving such preparation.

SUBJECTS: Experimental and control groups each contained 38 University of Minnesota freshmen. All subjects were male, non-veterans with no previous college experience, and no previous professional counseling.

PROCEDURE: (1) The experimental group was prepared for counseling by an intensive lecture followed

by a group discussion led by an experienced counselor. Lecture plus discussion required about 50 minutes and dealt with the aims and methods of vocational counseling, with particular emphasis on the roles of counselor and counselee. (2) All subjects, experimental and control, were counseled by the same counselor. The interviews were electronically recorded and verbatim typescripts were made. (3) The experimental and control groups were then compared on the following criteria: (a) attitude-information test to determine the counselee's conception of his and the counselor's roles and the function of tests in the counseling interview. This test was taken before the interview, (b) check list of possible complaints about the interview completed by the subject following the interview, (c) counselee's rating of the over-all value of the interview, and (d) ratings of the counselee's interview behavior by three judges (experienced counselors) using the verbatim typescripts.

RESULTS: (1) On the attitude-information test, the experimental group demonstrated significantly better understanding of the counseling process (significant at 1 per cent level). (2) The control group registered more points of dissatisfaction with the counseling interviews than did the experimental group (significant at 5 per cent level). (3) There was no significant difference between experimental and control groups on the counselee's over-all ratings of the value of the interview. (4) Judges' ratings on five criteria with respect to the interview behavior of the two groups will be analyzed.

10:15 AM The validation of the Cornell Index for freshmen at Michigan State College. WILLIAM A. MANN, *Michigan State College*.

PROBLEM: To determine the effectiveness of the Cornell Index in screening persons having personality maladjustments from the freshman class.

POPULATION: 1298 freshmen at Michigan State College were used to standardize the Cornell Index for college students. 397 persons in this group also took the MMPI, and 312 were interviewed by counselors.

PROCEDURE: The Index was administered to 1298 freshmen who were representative of the entire class. The ranges, means, and standard deviations were determined for both sexes. Scores on the MMPI were available on 397 persons in this group. Correlation coefficients were computed between the scores on the Index and the average of the top three scores, the neurotic triad, the psychotic triad, and several individual scores on the MMPI. Comparisons were also made between scores on the Index and counselors' judgments.

RESULTS: The range of scores on the Cornell Index was 0-44 for men and 0-52 for women. The highest

correlation found was between the Index and the average of the three highest scores on the MMPI. The depression scores on the MMPI correlated higher than any other single phase when compared to the C.I. The MMPI picked a higher per cent as maladjusted than did either the C.I. or the counselors. When compared on the basis of three levels of adjustment, the differences in classification by the three methods were small.

**CONCLUSIONS:** Since the differences in classification obtained by using the three methods were small, the Cornell Index appears to be a satisfactory instrument for screening individuals with personality maladjustments from the freshman class.

10:30 AM A technique for occupational exploration which aids in clinical evaluation of counseling.  
CLYDE J. LINDLEY, *Advisement and Guidance Service, V.A.*

The values derived from securing an adequate record of the process of occupational exploration have been frequently overlooked. As a result, the counselor's own evaluation and interpretation of counseling often fails to substantiate or explain fully what has happened during counseling. A technique of occupational exploration based upon Part IV of the Dictionary of Occupational Titles has been developed to insure more attention to systematic and thorough occupational exploration, and, at the same time, provide a means for recording the process. This approach emphasizes the fact that there are many occupations related to a Part IV field of work which require a similar pattern of worker characteristics. Stated in another way, it enables the counselor and counselee to identify a larger number and range of occupations which require a similar pattern of interests, abilities, aptitudes, and personality characteristics. In the process of occupational exploration, there is an attempt to match the individual's education, experience, personality characteristics, etc., with the broad occupational categories originally selected and the subsequent specific occupational choices. The counselor uses all available data, such as personal history information and test results, to secure counseling leads requisite to matching the individual's capacities with major occupational groupings and subsequent finer choices.

The recording of occupational explorations is not done routinely since the counselee actively participates in the process of occupational exploration. The counselor's evaluation and interpretation of the counseling are more directly related to justification of the occupational choices finally selected.

This new occupational exploration technique has been extensively used in all VA Guidance Centers

and all other counseling units of the VA since October 1, 1949. Illustrative cases explaining the technique of occupational exploration will be presented and the implications of this approach to the problems of evaluating counseling will be discussed.

10:45 AM The value of the U. S. Civil Service Commission Form 57 in predicting the success of Veterans Administration vocational advisers.  
MITCHELL DREESE, *George Washington University*, and SAMUEL KAVRUCK, *U. S. Civil Service Commission*.

**PROBLEM:** To present a picture of the qualifications of Veterans Administration vocational advisers as revealed by an analysis of the U. S. Civil Service Commission Form 57, and to determine the prognostic value of the items on this form in predicting success as an adviser.

**SUBJECTS:** A sampling of 362 male P-3 and P-4 advisers from 27 states who had filed applications for the Federal examination for vocational adviser in order to secure permanent Civil Service status.

**PROCEDURE:** Data from the 39 items of the Form 57 were tabulated in order to show the background and qualifications of the P-3 and P-4 advisers. Each of these factors was then studied in relation to the criterion of vocational success, namely the rating of the supervisor.

**RESULTS OR CONCLUSIONS:** (1) The reliability of the supervisor's rating was 0.92. (2) The correlation between Civil Service grade and job rating was 0.13. (3) The factors on the Form 57 most indicative of success as a vocational adviser were: experience in public school administration, related military experience, possession of a graduate degree, and membership in related professional societies. (4) The following factors did not differentiate between good and poor advisers: age, college major, length of experience as a V. A. Adviser, prior experience as a counselor, teaching experience, and general work experience.

## COUNSELING AND OCCUPATIONAL ADJUSTMENT

11:10 AM-12:10 PM, Monday, Sparks 10

SETH ARSENIAN, Chairman

11:10 AM Technological change and counseling problems. IRWIN A. BERG, *Northwestern University*.

**PROBLEM:** To analyze the changes in job grade and employee skill requirements brought about by technological changes in production methods in a factory division with 983 employees during the years 1923-

1937, and the counseling problems which grew out of these changes.

**SUBJECTS:** 983 factory employees of which 762 were male and 221 female.

**PROCEDURE:** Data on hourly rate of pay, labor grade, and job skill requirements were tabulated for 234 factory jobs and the 983 persons who filled these jobs at various times during the 15-year period 1923-1937. The effect of the introduction of new machines on job skill requirements was also examined, together with the counseling problems which stemmed from these technological changes.

**RESULTS:** It was found that for the 9-year period, 1923-1931, a graph of the distribution of job skill requirements was essentially a skewed normal curve, with the majority of the workers employed in jobs demanding an average level of skill. A curve of approximately the same shape was found for hourly rates of pay during the same period. In 1932 and thereafter, new machines which eliminated certain average-level-of-skill jobs were introduced. Some of these new machines required greater skill, while others required less skill, to operate than the machines they replaced. Pay rates were also adjusted upward or downward in accordance with the skill demands. In consequence, the curves for skill and rate of pay assumed a somewhat bimodal shape, and this bimodality became more pronounced each year after 1932. Since there was a marked decrease in the number of average-skill jobs, avenues of advancement and pay increase which were previously open to the younger, lower-level-of-skill employees now were blocked. This situation created numerous vocational counseling problems related to training, promotion, selection, and transfer. (Slides)

11:25 AM Occupational aptitude patterns of clerical workers. W. LESLIE BARNETTE, JR., *New York University*.

**PROBLEM:** To construct profiles, based on aptitude test scores, of successful versus unsuccessful clerical trainees.

**SUBJECTS:** 111 counseled veterans, all "completed" advisement cases of the Vocational Service Center, New York City, approved for clerical objectives for whom psychometric data were available.

**PROCEDURE:** By means of a mail questionnaire follow-up, the training status of these counseled veterans was ascertained some two years after last seen. By this means a "success" and "failure" group was obtained. Profiles, based on mean aptitude test scores, were then constructed for these two samples and checked for significant inter-test differences and for overall similarity-dissimilarity. Comparisons between the two contrasted clerical groups here showed

few significant differences, only the clerical aptitude test differentiating them. It was a picture of mediocre aptitudes, all mean T-scores being close to 50. When two clerical sub-groups were formed, differentiated by means of DOT code numbers, clear differences between the successes and failures emerged: the "general" sub-group (DOT numbers 1-0 and 1-1) are the persons without training in machine skills; the "specialized" (DOT numbers of 1-3) are those with technological office skills. The two success groups and the two failure groups now show clear separation by means of profile data. Checks made with these results against earlier occupational ability pattern research, where an outside success criterion was available, substantiate the psychometric trends revealed by the present aptitude patterns. The psychometric trends of these two Success and Failure groups will be presented.

**CONCLUSION:** The results point to the futility of working with "clerical workers in general" when discussing aptitude patterns. It is more relevant from a counseling point of view to deal with homogeneous groups, among which clear differences as to measured characteristics are shown.

11:40 AM The significance of interpersonal relationships in job performance. ELMER D. WEST, *American Institute for Research*.

Much attention has been given to aptitudes for job performance, but inadequate data as to the role of interpersonal factors in job performance are available. In several recent studies critical incidents, or descriptions of behavior reported as making the difference between ineffective and outstanding performance on the job, have been obtained and classified in order to determine the critical requirements of personnel in the jobs studied. The importance of interpersonal relationships in job performance, as shown by the proportion of incidents in that area, is given for each of five groups: hourly-wage employees in an industrial organization, air route traffic controllers, United States Air Force Officers, dentists, and scientists and engineers. Four of the groups were studied by the American Institute for Research and the fifth by a staff member of the Institute. The approximate number of behaviors obtained for each of the groups was, respectively: 2500, 1200, 3000, 900 and 2500.

Regardless of the level of the performer, or the nature of his work, to the extent that these five groups may be representative, it is apparent that supervisors, co-workers, and others judge as critical many behaviors not directly concerned with technical competence in carrying out the duties of the job. To illustrate: in one of the studies, the area of personal

habits and adjustment accounted for 30% of all reported behaviors, and approximately three-fourths of these were ineffective behaviors. The specific kinds of interpersonal behaviors reported as critical in the various groups will be given, and the significance of such relationships with reference to counseling and to the educational process will be indicated.

11:55 AM Job satisfaction as criterion and point of reference in interest measurement. MILTON SCHWEBEL, *New York University*.

**PROBLEM:** To compare the effectiveness of an interest scale of the Strong Vocational Interest Blank whose weights are based on differences between the satisfied members of an occupation and non-members, with one based on differences between satisfied and dissatisfied members.

**SUBJECTS:** Criterion group, 450 registered pharmacists in New York State (except New York City); validation group, 105 registered pharmacists in New England and New York, and 52 medical school upperclassmen.

**PROCEDURE:** Responses on the Pharmacy Satisfaction Scale were used to establish an index of satisfaction and to separate the criterion group into 333 satisfied and 117 dissatisfied pharmacists. Two new scales for the Strong were constructed: The Vocational Interest Scale for Pharmacists (satisfied pharmacists vs. men-in-general), and the Satisfied vs. Dissatisfied Pharmacists Scale. The Strong Blanks of these 450 pharmacists were scored on the pharmacy and six non-pharmacy scales of the Strong; those of the 105 validation-group pharmacists on the pharmacy scales; those of the 52 non-pharmacists on the pharmacy scales and on their own. Mean scores of these groups were compared and differences tested for significance ( $P$  of 0.05 or less).

**RESULTS:** (1) Pharmacists obtain significantly higher scores on the pharmacy than on non-pharmacy scales. (2) They make higher scores than non-pharmacists make on the pharmacy scales. (3) Non-pharmacists earn higher scores on their own occupational scale than on either pharmacy scale. (4) Satisfied pharmacists do not make a higher average score on the Satisfied vs. Dissatisfied Pharmacists Scale than on the Vocational Interest Scale for Pharmacists. (5) The difference between satisfied and dissatisfied pharmacists is significant on the Satisfied vs. Dissatisfied Scale but falls short of significance on the Vocational Interest Scale. Since, in their construction, these two scales differ only in the point of reference used (non-pharmacists in one case, dissatisfied pharmacists in the other), the variance in differentiating ability of the scales is attributed to this.

## EVALUATION OF COUNSELING TOOLS AND TECHNIQUES

### I. TESTS OF APTITUDES AND ABILITIES

4:00-5:00 PM, Monday, Sparks 10

RALPH F. BERDIE, Chairman

4:00 PM A longitudinal study of performance on the Henmon-Nelson Test of Mental Ability, the Differential Aptitude Tests, and the American Council on Education Psychological Examination for College Freshmen. ROYAL B. EMBREE, Jr., *University of Texas*.

**PROBLEM:** Since these three measures are widely used, it would be helpful to know the statistical relationships among them when they have been administered at various stages in the educational development of students. Such relationships might be of considerable value to counselors.

**SUBJECTS:** 99 boys and 83 girls who completed the college-preparatory curriculum at Corpus Christi High School, Corpus Christi, Texas in May, 1950.

**PROCEDURE:** Subjects included in the study were tested during junior high school and their I.Q.'s were determined by use of the Henmon-Nelson Test of Mental Ability between 1943 and 1947. They entered tenth grade in September, 1947, and were given the Differential Aptitude Tests (Bennett, Seashore and Wesman) in the spring of 1948. The same Differential Aptitude Tests were repeated in March, 1950. During April, 1950, these students took the 1941 form of the American Council on Education Psychological Examination for College Freshmen. I.Q.'s, raw scores and other data were punched on I. B. M. cards as they became available and statistical operations were carried out with maximal use of mechanical equipment.

**RESULTS OR CONCLUSIONS:** The groups represented a homogeneous population of boys and girls who had completed college-preparatory programs in a southern secondary school. A multiple correlation of 0.77 was found to exist between I.Q.'s determined during junior high school and the Verbal Reasoning, Numerical Ability and Abstract Reasoning tests of the Differential Aptitude Test battery. This relationship was sufficiently high to suggest that equation tables based upon I.Q. and a composite of these three D. A. T. scores might be useful in counseling. Relationships among the Henmon-Nelson I.Q.'s, scores on both the tenth-grade and twelfth-grade Differential Aptitude Tests and scores on the American Council Psychological Examination will be reported at the meeting.

4:15 PM The relationship of Owens-Bennett test scores to first-year achievement in an engineering college. ROBERT W. HALLIDAY and FRANK M. FLETCHER, JR., *Ohio State University*.

PROBLEM: To determine the relationship between scores at entrance on the Owens-Bennett Test (Form CC) and grades earned during the first year at an engineering college.

SUBJECTS: 130 freshmen in the College of Engineering at The Ohio State University.

PROCEDURE: The test was administered during the fall quarter to students—predominantly freshman engineers—in an engineering drawing class. Correlations have been computed between test scores and first-quarter grade average and test scores and grades in engineering drawing and engineering algebra courses. The correlation between test grades and first-year total grade average will be computed at the end of the school year. Interrelations with other tests, including the Ohio State Psychological Examination, have also been computed.

RESULTS: Mean score on the test was 36.18, with a standard deviation of 8.71. Pearson correlations were 0.46 for engineering drawing grades, 0.23 for algebra grades, and 0.41 for first-quarter grade average.

CONCLUSIONS: Consideration of the Owens-Bennett for inclusion in batteries of engineering tests seems warranted.

4:30 PM College Board Mathematical Tests (a) and the Pre-Engineering Inventory (b) as predictors of scholastic success in colleges of engineering. A. PEMBERTON JOHNSON, *Educational Testing Service*.

PROBLEM: How well do the College Entrance Examination Board Mathematical Tests and the Pre-Engineering Inventory predict scholastic success in colleges of engineering?

SUBJECTS: (a) 721 enrolled engineering freshmen tested in the Fall of 1948 with the College Entrance Examination Board Scholastic Aptitude Test—Mathematical Section (SAT-Math) and the Comprehensive Mathematics Achievement Test (CMT) during their first week at five colleges: Carnegie Institute of Technology, Cornell University, Lehigh University, Rutgers University, and the University of Pennsylvania. (b) 1977 enrolled engineering freshmen tested in the Falls of 1944, 1945, and 1946 with the Pre-Engineering Inventory at twelve colleges: California Institute of Technology, Carnegie Institute of Technology, Columbia University, Georgia School of Technology, Massachusetts Institute of Technology, Newark College of Engineering, North Carolina State College of Agriculture and Engineering, Oklahoma Agricultural and Mechanical College, Oregon

State College, University of California at Los Angeles, University of Michigan, University of Texas. PROCEDURE: (a) Weighted average zero-order and multiple correlation coefficients against first-year grades were obtained. High school grade record was included as a predictor variable. (b) Zero-order correlation coefficients and a median of these were obtained.

RESULTS: The tests mentioned below provide very effective prediction of first-year grades in the engineering colleges named above. (a) Weighted average validity coefficients against first-year grades, five colleges:

High School record plus CEEB Composite (SAT-Math plus CMT)	0.68
High School record plus CEEB Comprehensive Mathematics Test (CMT)	0.65
High School record plus CEEB Scholastic Aptitude Test—Mathematics Section	0.66

(b) Median validity coefficient against first-year grades, twelve colleges:

Pre-Engineering Inventory Composite (Test II, Technical Verbal Ability; Test III, Comprehension of Scientific Materials; Test IV, General Mathematical Ability)	0.60
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Acknowledgment is made of the work of Dr. John T. Cowles, Mr. Manuel Cynamon, Mr. Frederic Lord and Dr. William B. Schrader in conducting the studies from which these data have been taken.

4:45 PM Educational successes and failures of students with high "Q" and low "L" on the American Council on Education Psychological Examination. D. D. SMITH and FRANCES O. TRIGGS, *University of Maryland*.

PROBLEM: The research done on "Q" of the ACE Psychological Examination seems to indicate that prediction of success in our college courses is seldom possible from this score. However, students with marked differences between the "Q" and "L" scores are admitted every year to our colleges. It is important that counselors know more about their capabilities if counseling is to be fruitful.

SUBJECTS: College freshmen at the University of Maryland.

PROCEDURE: It is probable that some of the characteristics of the educational patterns of these students has been covered up by the tendency to use correlational techniques to evaluate them. A first step in a more definitive study is made here by use of "t" and careful definitions of areas are measured.

RESULTS AND CONCLUSIONS: While there are many suggestive by-products of these data, the conclusion

most clearly evident relates to the fact that the level of the linguistic skill affects the extent to which students can apply the "Q" ability, and that this level varies with types of courses. There is also indication that above a given level, "over-learning" in the verbal area may bring profitable results if reward from college work is great enough to warrant the effort. This study suggests that counselors may use such definitive data profitably in educational counseling of students. It is probable that motivational and patterns affecting behavior also can be studied with reference to these findings.

## EVALUATION OF COUNSELING TOOLS AND TECHNIQUES

### II. INVENTORIES

11:10 AM-12:10 PM, Tuesday, Elec. Engr. 110

IRWIN A. BERG, Chairman

11:10 AM The relationship of certain variables to discrepancy between expressed and inventoried vocational interest. WIMBURN L. WALLACE, *University of Massachusetts*

**PROBLEM:** To investigate the relationship of the following variables to discrepancy between expressed and inventoried vocational interest: (1) simulation scores on scales of the Strong blank corresponding to expressed occupational choice, (2) opportunity to gain information about chosen occupation, (3) indications of self-conflict in attitudes toward chosen vocations, and (4) certain specific aspects of background and self-appraisal.

**SUBJECTS:** 238 male undergraduates at the University of Michigan representing three areas of vocational preparation: medicine, engineering, and public accounting.

**PROCEDURE:** The subjects completed, in the following order, the Strong Vocational Interest Blank under standard directions; a personal data questionnaire containing items concerning background of, and attitudes toward, their present vocational choice; and the Strong blank with special directions to make their responses as much like those of typical men in their chosen occupation as possible. The *t*-test and chi square statistical techniques were applied in the analysis of the data in order to discover significant differences between those whose expressed and inventoried interest coincided (non-discrepant), and those whose inventoried interest did not agree with their expressed interest (discrepant) with respect to the variables examined.

**RESULTS:** Non-discrepant, when compared with discrepant, attained significantly higher simulation

scores on appropriate scales of the Strong, had had more opportunity to gain information about the occupation of their choice, had less self-conflict about their vocational selection, and excelled in 5 out of 25 specific aspects of background and self-appraisal investigated.

11:25 AM The development of a "Youth Inventory" for use in guidance and curriculum planning. BENJAMIN SHIMBERG, *U. S. Public Health Service*

**PROBLEM:** To develop a problems inventory for high school students to serve as a tool in guidance, and as a survey technique for curriculum planning.

**SUBJECTS:** A nationwide sample of approximately 12,000 high school students, grades 9-12.

**PROCEDURE:** A 300-item check list was developed from items extracted from the anonymous essays of 500 students and from other sources. Problems were grouped into eight *a priori* categories: (1) my school, (2) after high school, (3) about myself, (4) getting along with others, (5) my home and family, (6) boy meets girl, (7) health, (8) things in general. The preliminary form was administered as an opinion poll. Results were analyzed for a stratified sample of 2,500 cases according to sex, grade, region, religion, community size, and economic status of respondents. Conventional test construction technology was applied to determine the homogeneity, reliability, and interrelationships of the eight problem categories. Items were shifted from their initial category when item analysis indicated that they belonged elsewhere. A panel of psychologists and educators classified the items as either indicative of some basic personality difficulty, or merely of problem recognition by the student.

**RESULTS:** Kuder-Richardson reliabilities for the eight categories ranged between 0.75 and 0.94; intercorrelations ranged from 0.20 to 0.67. A "Basic Difficulty" key with a Kuder-Richardson reliability of 0.90 has been developed for experimental use. Thus far, validity is based only on internal evidence. Separate percentile norms are available according to sex, grade, and community size. Experience indicates that the use of IBM mark-sense cards makes large scale student surveys practical and economical. Both hand-scored and IBM machine-scored forms of the inventory are now available.

11:40 AM A variation of the cross-questionnaire technique applied to parent-child relationships in the counseling process. MARGARET S. JESSEN, *San Francisco State College*.

**PROBLEM:** To ascertain the ability of parents to fake the responses of their adolescent children on interest and adjustment questionnaires.

**SUBJECTS:** Fifty high school students and their parents.

**PROCEDURE:** The Kuder Preference Record and the Bell Adjustment Inventory (student form) were administered to 50 high school students. The Kuder and adult form of the Bell were also administered to the parents with the standard instructions. The Kuder and student form of the Bell were then given to the parents with the instruction to respond to the items as they thought their child would. All subjects supplied personal data on age, occupation and education. An unstructured interview with parent and child followed the testing experiment.

The data to be presented will consist of the possible intercomparisons of the descriptive statistics, and the relationships of personal data with the magnitude of parental understanding as measured by the faking score.

**RESULTS:** Odd vs. even reliability coefficients of parents' faking score of 0.94 and 0.90 were obtained on the Bell and Kuder items respectively. The mothers predicted best for sons and the fathers best for daughters. Parent's ability to fake responses of their child on the Bell yielded positive correlations of the order of 0.70 on all items; 0.65 on emotional scale; 0.60 on social scale; 0.37 on home adjustment scale; and 0.30 on items pertaining to health adjustment. Faked versus observed responses on the Kuder scales yielded positive correlations from 0.94 on the Artistic scale down to 0.53 on the Computational scale. A rank order correlation of the order of .75 indicates a positive relationship between faking ability on the two inventories, of the parents in this study.

**CONCLUSIONS:** These data are still being analyzed but thus far seem to support the value of this technique for use in parent-child counseling.

11:55 AM An investigation of the background experiences of socially accepted and rejected adolescent at three economic levels. M. R. FEINBERG, *New York University*, and D. H. FRYER, *Richardson, Bellows, Henry & Company, Inc.*

**PROBLEM:** The problem was to determine whether or not background experiences are predictive of social acceptability among adolescent boys; and if so, to ascertain what background experiences are generally characteristic of all adolescent boys, and what depend upon their economic status.

**SUBJECTS:** The population consisted of approximately 2500 adolescent boys between the ages of 13 and 16. Two samples were taken at each of the three con-

trasting economic levels in New York City, and two others drawn from other geographic areas for verification of results.

**PROCEDURE:** Subjects' choices of seatmates were used as the criterion of social acceptability, and estimated financial income of parents as the criterion of economic status. All students completed a Personal History Questionnaire, constructed to represent the areas to which an adolescent adjusts in his development. The chi-square statistic was utilized to ascertain the degree of significance of item alternates between high and low criterion groups in predicting the criterion of social acceptability.

The items found to predict significantly at different economic levels and for all adolescent boys were combined into scoring keys. The correlations obtained between the social acceptability criterion and scores obtained with economic scoring keys, and overall scoring keys were compared to indicate the degree of commonness among economic levels in predictive background experiences.

**RESULTS:** (1) Quantified background experiences are valid predictors of social acceptability at the three economic levels and for adolescent boys generally. It is possible to establish scoring keys for predictive purposes with a reliability of better than 0.93 and a validity of better than 0.50. (2) There is a basic commonness in the background experiences predictive of social acceptability among the economic levels. (Slides)

## SYMPOSIUM: RESEARCH IN PROGRESS

1:40-3:50 PM, Tuesday, Elec. Engr. 110

KENNETH LITTLE, Chairman

Reports by: SETH ARSENIAN, RALPH F. BERDIE, FRANK M. FLETCHER, Jr., and GEORGE S. SPEER

## BUSINESS MEETING AND PRESIDENTIAL ADDRESS

4:30-6:00 PM, Tuesday, Elec. Engr. 110

JOHN G. DARLEY, President

## SYMPOSIUM: COUNSELING IN INDUSTRY

2:50-5:00 PM, Friday, Elec. Engr. 110

(Co-sponsored with Division 14. See Division 14's program.)

## DIVISION OF PSYCHOLOGISTS IN PUBLIC SERVICE

## RESEARCH IN GOVERNMENTAL AGENCIES

8:50-9:50 AM, Monday, Sparks 316

DAVID J. CHESLER, Chairman

8:50 AM Use of job analysis in developing a differential battery. ERNEST S. PRIMOFF, *U. S. Civil Service Commission*.

PROBLEM: To develop a differential battery for eight different jobs in an expanded temporary program when insufficient numbers of persons are available for complete pre-validation purposes.

SUBJECTS: 82 in pre-validation; 400 in follow-up.

BACKGROUND: The Division of Disbursement, Treasury Department, planned to hire a large temporary force to take care of disbursing veterans' insurance dividends. A differential battery was desired for eight jobs. In most jobs, there were not enough present employees to permit pre-validation. To hire and assign persons at random, and validate later, would have been wasteful since results would be known only after the program was completed.

PROCEDURE: Tests were selected on the basis of job analyses. For four of the jobs, in each of which 18 or more workers were available, correlations with job performance were found in order to check the job analysis but not in order to affect allocation of tests in the battery. For all the jobs, test scores of incumbents were used to help set passing standards.

RESULTS: Where pre-validation was possible, correlations between supervisory ratings and tests selected by job analysis were high and indicated definite differentiation among types of job. The follow-up after the workers were employed indicated that whereas temporary workers are usually only 50 per cent to 75 per cent as productive as regularly employed workers, the personnel hired by means of the tests were at least 30 per cent more productive than regularly employed workers, even though time was taken for training. Workers who were transferred to positions for which they were not qualified by test score, in order to balance work load, were found by the supervisors to be poorer than those selected in accordance with test results. Further results, including test intercorrelations, will be presented.

9:05 AM Application of Guttman's scale analysis to objective test analysis and construction. M. D. DAVIDOFF and A. P. MASLOW, *U. S. Civil Service Commission*.

PROBLEM: The "Cornell" scaling technique has been applied primarily to attitude and opinion measure-

ments. The problem is to study its application to an aptitude test as a method of test refinement, in comparison to a standard item-analysis method, and to determine what practical advantages for test construction and analysis it offers.

SUBJECTS: (1) For scaling, and item analyses, two random samples ( $N_1 = N_2 = 125$ ) of applicants in 1947 for U. S. Military and Naval Academies; (2) for validation, two samples ( $N = 159$  and  $167$ ) of successful applicants who have completed 1st term academy courses; (3) for followup on scale stability, 200 applicants in 1949 examination.

PROCEDURE: Scale analysis (using Guttman's criteria with certain modifications) of the 50-item Algebra Test from a battery including Verbal and Spatial Tests resulted in a scale of 19 items. Point-biserial correlations of all 50 items were computed; and the highest 19 items selected for comparison; these included 12 of the scaled items. For both sets of 19, reliabilities, intertest correlation and correlations with academic course grades were computed, and content analysis made. For a later alternate series, the analogous 19 items were isolated and test intercorrelations computed.

RESULTS: Scale analysis is practicable but, even with IBM equipment, relatively more subjective and complicated than the point biserial method. Scaled items are homogeneous in content and type, and the analysis had direct application to item-construction techniques. Both the scale and point-biserial sets are satisfactorily reliable, and correlate highly with the original test. They have reduced correlations with verbal and spatial tests, and not quite as high validity coefficients when substituted in the battery for the original test. Technical problems in scale analysis, special IBM procedures, and possible contribution to increase in test efficiency per unit testing time are discussed.

9:20 AM The validity of short paper and pencil tests for prediction of training success and of subsequent production records of card punch operators. A. P. MASLOW, *U. S. Civil Service Commission*.

PROBLEM: To investigate the relationship between short written aptitude tests and success in a 60-hour training course, and subsequent production efficiency of numeric card punch operators.

SUBJECTS: Fifty-nine senior highschool girls who volunteered for card punch training given by the D. C. schools. Of these, 26 entered into full-time production in the Bureau of the Census.

PROCEDURE: A battery of five relatively short paper and pencil tests of clerical aptitude and dexterity was

administered to the total group prior to entrance into training. Correlations between test scores and success in training, as measured by work sample tests given in the last three sessions of training, were computed. Of the original 59 trainees, 26, unselected with regard to test scores, went into full-time production work, and production records at the end of 40 and 80 hours on the job were obtained. Comparisons were made between production standards of new and experienced operators, and correlations computed between the tests, training criterion, and production records. Retest reliability of the test battery was obtained.

**RESULTS OR CONCLUSIONS:** Short, but reliable and easily administered, paper and pencil tests proved satisfactorily valid for predicting success in training ( $R = 0.54$  for two tests,  $0.58$  for three tests, and for predicting production,  $R = 0.59$ ). A more adequate but similarly designed study will have been completed with several hundred new employees being trained for work with the 1950 population census.

These studies are being carried out with the collaboration of David Futransky of the Personnel Division of the Bureau of the Census and M. D. Davidoff of the United States Civil Service Commission.

9:35 AM Merit system selection of chauffeurs and truck drivers. JOHN F. SCOTT, ERNEST S. PRIMOFF, and SAMUEL KAVRUCK, *U. S. Civil Service Commission*. (Sponsor, Ernest S. Primoff)

**PROBLEM:** To select from a group of applicants, all of whom meet experience requirements, those who will have safe driving records after employment.

**SUBJECTS:** For the analysis of the experience rating method, 400 out of 952 candidates rated eligible on the basis of experience were studied. As many of the same group as take a road test in the next few months will be used.

**PROCEDURE:** An experience rating system operating on the basis of a system of bonuses and penalties around the basic rating of minimal qualification was established. Verification was made of the accident and arrest records submitted by the applicants by checking with official records of motor vehicle authorities in the District of Columbia and nearby states. The ex-

tent to which this experience rating method ranked competitors in order of desirability from the standpoint of safety was studied. A road test designed to further screen applicants on the basis of their safe driving habits rather than driving skill or knowledge of traffic regulations was established. Vigorous efforts are made to train performance-test examiners to a high degree of uniformity in administration. Plans for follow-up after employment have been made.

**RESULTS:** Use of the experience rating method yielded a group of high-ranking eligibles who had one-ninth the accident frequency rate of the candidates rated ineligible. Those candidates finally rated eligible, as the least promising prospects for employment, had an accident frequency rate one-half that of the ineligibles. The results of pilot studies with the road test indicate a high degree of relationship between performance test rating and past safety violations, both accidents and arrests. Further data on this point will be available.

#### SYMPOSIUM: PSYCHOLOGICAL POSITIONS AND UTILIZATION OF PSYCHOLOGISTS BY PUBLICLY SUPPORTED AGENCIES AND ORGANIZATIONS

10:00 AM-12:10 PM, Monday, Sparks 316

ARNOLD H. HILDEN, Chairman

Participants: BEATRICE J. DVORAK, ERNEST S. PRIMOFF, H. S. CONRAD, MARION BARTLETT, LEO LOWENTHAL, NATHAN JASPEN, HELEN PRICE, JERRY W. CARTER, SIDNEY ADAMS, THOMAS L. BRANSFORD, ROBERT J. LACKLEN, and LYNDON BABCOCK

#### PRESIDENTIAL ADDRESS AND BUSINESS MEETING

4:00-6:00 PM, Monday, Sparks 316

ROGER M. BELLOW. *Selling Psychological Services to Administrators*

### DIVISION OF MILITARY PSYCHOLOGY

#### MILITARY PSYCHOLOGY I: HUMAN ENGINEERING

8:50-9:50 AM, Monday, White Hall 105

WALTER F. GREYER, Chairman

8:50 AM The airline tryout of the standard flight-check for the Airline Transport Rating. JOHN A. NAGAY, *American Institute for Research*.

**PROBLEM:** To determine the test-retest reliability of an objective flight-check for the Airline Transport Rating when used with airline pilots. The first phases covering the development of this new flight-check for the Civil Aeronautics Administration have been reported by Thomas Gordon and John C. Flanagan.

**SUBJECTS:** Thirty-two airline pilots, 17 captains and 15 first officers.

**PROCEDURE:** A third revision of the flight-check, based on intensive reviews by 2 qualified pilot groups and the findings of earlier tryouts, was prepared. Each subject flew 2 successive flights in multi-engined equipment. Checking was done by 33 airline check pilots and 30 CAA agents on 63 flights, monitored by qualified research personnel. Both the new flight-check and the present CAA form were used. Following the tryout, the flight-check was again reviewed by the 2 pilot groups who evaluated the worth of participants' suggestions for revisions.

**RESULTS:** Ride-ride reliability coefficients for the objective flight-check were found to be 0.89 ( $r$ ,  $N = 40$ ) for total "Qualified-Not Qualified" scores, and 0.71 ( $r$ ,  $N = 40$ ) for total numerical scores. For the CAA Flight Test Report, ride-ride reliability coefficients of 0.35 ( $N = 43$ ), 0.49 ( $N = 43$ ), and 0.50 ( $N = 29$ ) were found for "Qualified-Not Qualified" ( $r$ ), Mean Maneuver, and Percentage total scores respectively.

**CONCLUSIONS:** The objective flight-check showed considerably higher reliability than the check in present use for certifying pilots for the Airline Transport Rating or others upon which data are available. It is in a form acceptable to qualified pilot groups and is being submitted to the CAA with the recommendation that it be adopted as the official flight test for the Airline Transport Rating.

This research was sponsored by the National Research Council Committee on Aviation Psychology with funds provided by the Director of Research of the Civil Aeronautics Administration.

9:05 AM An experimental study of the transfer value of synthetic flight trainers for advanced multi-engine flight training in the Naval Air Training Command. WALTER R. MAHLER and GEORGE K. BENNETT, *Psychological Corporation*.

**PROBLEM:** (1) To determine how much actual syllabus flight time can be saved by the utilization of synthetic flight trainers. (2) To obtain information which will be of value in the design of future flight trainers of this type. (3) To determine what principles of utilization provide the maximum transfer value.

**SUBJECTS:** Ninety-six regular students in three successive classes in advanced multi-engine flight training.

**PROCEDURE:** (1) The technique of matched pairs was used to establish two equivalent groups. Check flight grades in basic training provided basis for matching. (2) Students in the experimental group received 11 periods of synthetic flight training. Practice in the trainer was given the day before each aircraft flight. Students in the control group received no synthetic flight training. (3) Each pair of students flew together on all plane flights in the regular syllabus. (4) An objective system of grading was developed for the

20 most crucial maneuvers in the familiarization and instrument phases. (5) Regular Navy instructors were used.

**RESULTS OR CONCLUSIONS:** The transfer effect of synthetic training will be reported in terms of time, trials and errors. Savings, if any, in actual syllabus flight time will be determined. Implications of data for design of future flight trainers and the principles of utilization which provide maximum transfer value will be given.

9:20 AM Operational activity analysis as a tool for the psychologist-engineer design team. JULIEN M. CHRISTENSEN, *Wright-Patterson AFB*.

**PROBLEM:** The purpose of this investigation is to determine whether or not operational activity data, as gathered and interpreted by psychologists, can be of use to those engineers who formulate instrument design and workplace layout programs.

**SUBJECTS:** Twelve randomly selected United States Air Force navigators were used in this investigation.

**PROCEDURE:** Subjects were observed on ten Arctic and mid-latitude missions. Approximately 60,000 activity samples were recorded during the 120 hours of flight.

**RESULTS AND CONCLUSIONS:** The intra-area and inter-area mission correlations indicate that the problems of the two areas must be handled separately. A detailed analysis of the navigator activities indicates that, given proper equipment and workplaces, the typical mid-latitude navigator soon should be able to perform, in addition to his own duties, the duties of another crew member, and that it may be possible to reduce the present arctic navigational crew from two or three to one. For example, it was found that of their total active time arctic and mid-latitude navigators spend respectively 34 per cent and 46 per cent on paper work and 49 per cent and 40 per cent on instruments. Techniques such as log work and celestial solutions must be made more efficient if they are to satisfy the navigational needs of high speed aircraft. The results are seen also as leading to the establishment of objective standards by which future equipment and workplace layouts can be assessed.

It is concluded that the psychologist is peculiarly equipped to gather and interpret data that enable him to make a significant contribution to the solution of the problems of design engineers by indicating where the engineer should direct his efforts in order to achieve the greatest efficiency in terms of accuracy, time, and money.

It is hypothesized that position in workplace is a significant factor in the operational determination of equipment utility. Suggestions for testing this hypothesis are offered. (Slides)

9:35 AM Effects of brightness and color of illumination on Link trainer performance. S. D. S. SPRAGG, *University of Rochester*.

**PROBLEM:** To determine the effects on Link trainer performance of varying the brightness and the color of the visual display at low photopic brightness levels. **SUBJECTS:** College undergraduates (ex-Air Force and ex-Navy pilots with extensive Link trainer time in the services). Exp. 1: N = 9; Exp. 2: N = 12; Exp. 3: N = 4.

**PROCEDURE:** An AN-T-18 Link instrument trainer was fitted with special light sources so that illumination of the instrument panel and the task instruction card could be carefully controlled. Subjects flew 32' modified "Charley" courses according to detailed instructions presented visually. Thus, the entire problem (getting flight instructions as well as reading flight instruments) was visual. The data of these experiments consist of deviations from the calculated perfect course if flight instructions had been followed perfectly.

**RESULTS:** Exp. 1. S's flew courses under illuminations of 0.01, 0.1 and 1.0 foot-lamberts of white light. Mean error of performance decreased as brightness level was increased. Exp. 2. S's flew courses at two brightness levels (0.01 and 0.1 foot-lamberts) under the following colors: red, orange-red, and orange-yellow. No superiority due to color of illumination was demonstrated, although for each color, performance was superior at the higher brightness. Exp. 3. S's flew the Link trainer under fatigue conditions (four-hour flights) with red and with white illumination, at two brightness levels (0.01 and 0.1 foot-lamberts). An optometric examination was given each S just before and just after each four-hour flight. Certain evidences of visual fatigue were noted from the examination as well as from flight performances. Performance was superior at the higher brightness level, but no superiority of red or of white lighting was demonstrated. (Slides)

### SYMPOSIUM: EVALUATING AND INCREASING PRODUCTIVITY IN RESEARCH

10:00 AM-12:10 PM, Monday, Osmond 119

(Co-sponsored with Division 5)

RALPH M. HOGAN, Chairman

Participants: HAROLD A. EDGERTON, JOHN C. FLANAGAN, ROBERT H. KNAPP, IRVING LORGE, DOUGLAS E. SCATES, and DONALD W. TAYLOR.

### SYMPOSIUM: EFFICIENCY REPORTING IN THE ARMED FORCES

1:40-3:50 PM, Monday, Sparks 316

REIGN H. BITTNER, Chairman

Participants: EDWARD A. RUNDQUIST (ARMY), EVERETT G. BRUNDAGE (NAVY), HARLEY O. PRESTON (AIR FORCE), and HOWARD F. UPHOFF (MARINE CORPS)

### MILITARY PSYCHOLOGY II: PERSONNEL

4:00-5:00 PM, Monday, White Hall 105

THOMAS W. HARRELL, Chairman

4:00 PM Follow-up validation of forced-choice items of the Army Officer Efficiency Report. EDWARD A. RUNDQUIST, B. JAMES WINER, and GLORIA H. FALK, *Personnel Research Section, AGO*.

**PROBLEM:** In a follow-up validation study, it was found that the total score on the Army Officer Efficiency Report maintained its validity when used as the official Army report. This study is to determine whether the specific forced-choice items maintained their relative validities.

**POPULATION:** A sample of 700 Regular Army officers of grades Lieutenant through Colonel.

**PROCEDURE AND RESULTS:** In January 1949, criterion data in the form of associate ratings were collected. Army efficiency reports rendered under official conditions were obtained from Army files. Item validities were computed and related to item validities of earlier validation studies. With two exceptions, the item validities showed the same sign as in the study leading to the establishment of the scoring key. This study throws light on the stability of preference check list forced-choice type of item over a period of time.

4:15 PM Validity of a graphic rating scale of officer efficiency. DOROTHY E. SCHNEIDER and JAMES R. BLACKBURN, *Personnel Research Section, AGO*.

**PROBLEM:** To compare validity of scales (estimating suitability for various types of assignment) on official Army Officer Efficiency Reports with validity under experimental conditions.

**SUBJECTS:** A sample of 218 officers on whom both criterion data and four or more efficiency reports were available.

**PROCEDURE:** Scales on *Estimated Desirability in Various Capacities* appear as one section of the Officer Efficiency Report. The section contains nine items which are rated on a five-point descriptive scale. The items are prefaced with an introduction, and are themselves defined. In a recent study of the report when

rendered under highly favorable conditions, this section was scored and revealed very promising validities. However, the reports were rendered for research purposes only, and previous studies have shown generally higher validities for experimental data. The present study was designed to discover what the validity of these scales would be in an official rating situation. Associate ratings served as the criterion. For each section of the Report Form (including Estimated Desirability), and for the total score, the average score received in four efficiency reporting periods was obtained, and correlated with the criterion. Multiple correlations were also obtained.

**RESULTS:** The scales on estimated desirability in these official reports had substantial validity, although not as high as in the experimental situation. The Estimated Desirability scales correlated as high with the criterion as did the total excluding this section. Validity estimates of other sections of the report were comparable to those obtained in earlier studies.

**CONCLUSION:** The scales studied appear to involve a very effective graphic rating method. Current research will determine what aspects of the scales contribute to the validity, and what scoring of the Officer Efficiency Report including these scales will yield highest overall validity. (Slides)

4:30 PM The prediction of officer potential of ROTC cadets. GEORGE F. NEWKIRK, HUBERT E. BROGDEN, and JUNE C. LOEFFLER, *AGO*.

**PROBLEM:** To develop a Self-Description Blank for the prediction of leadership qualities in ROTC cadets.

**POPULATIONS:** Six groups (total  $N = 3236$ ) of ROTC students from military colleges.

**INSTRUMENTS:** *Preliminary:* Form A—811 questionnaire items; and Form B—811 items comparable in content to Form A. *Experimental:* Form I—230 keyed items from prior forms used for a similar purpose; and Form II—345 forced-choice pairs and 75 yes-no items. *Criterion:* Ratings on officer potential were used as criteria.

**PROCEDURE:** Using four groups of ROTC cadets, preference values and item validities were determined for each item in both preliminary forms. Two experimental forms were used in obtaining preference values. Form II was then constructed from the best alternatives in Forms A and B by pairing alternatives found to be equally preferable but widely different in validity. Seventy-five of the list items were included in yes-no form. For Form I, item alternatives were keyed which were found to be valid in previous instruments. For Form II, the more valid alternative of the pair was keyed. Forms I and II were administered to a fifth population and associates and superiors ratings on officer potential were obtained both at school and at

summer camp. Item analysis was accomplished, and two additional keys were then developed: one contained previously keyed items that did not hold up; the other contained valid items not included in the original key. Cross-validation of the above keys will be reported for the sixth group.

**RESULTS:** The original keys for Forms I and II yielded validities of 0.25 and 0.35 respectively. A composite of the two had a validity of 0.41. All keys in the cross-validation population will be reported, as will the validity of a "best composite."

4:45 PM Validation of proficiency tests for Infantrymen. MILTON LEVINE and WILLIAM A. GORHAM, *Personnel Research Section, AGO*.

**PROBLEM:** As part of the Army's enlisted Career Guidance Program, promotion to higher grades in a career field within a specific promotional ladder is based, in part, upon a written test of technical proficiency.

**SUBJECTS:** On the basis of job analysis information, essential areas to be tested in the Infantry occupations were designated. The number of items to be written in each area was ascertained by a field review. Test items were then written by subject matter experts with the assistance of test technicians, to insure the adequate sampling of the jobs based upon accepted job descriptions. Finally, tests were reviewed at The Infantry School and at operating infantry divisions in the field to insure the accuracy of the latest technical doctrine, and that the point of view of field personnel was adequately reflected in the tests.

**PROCEDURE:** Tests were then administered to infantrymen, world-wide, as part of the job-promotion program. Concurrently with this test administration, the criterion phase of this study was undertaken. This involved ratings by superiors and subordinates on graphic rating scales specifically designed for the Infantry, and in addition, personal history data were obtained. From this criterion research study, criteria suited to the Infantry Career Field were developed and analysis based on this external criterion conducted on the Infantry Tests.

**RESULTS:** The continuous nature of the testing program includes the improvement of proficiency tests insofar as practicable and feasible. The results of this study will be discussed, and the implications given, for the identification and selection of valid test items based upon an external criterion. A comparison will be made between item selection based upon external and internal criteria.

## BUSINESS MEETING

5:00-6:00 PM, Monday, White Hall 105

ARTHUR W. MELTON, President

# SYMPOSIUM: TRAINING AND EDUCATIONAL FILMS

8:50-11:00 AM, Tuesday, Osmond 109

MARK A. MAY, Chairman

Participants: C. R. CARPENTER, JAMES J. GIBSON, and ARTHUR A. LUMSDAINE

## MILITARY PSYCHOLOGY III: PSYCHOPHYSIOLOGY

11:10 AM-12:10 PM, Tuesday, White Hall 105

HENRY A. IMUS, Chairman

11:10 AM The intelligibility of highly speeded speech for purposes of auditory communication. RICHARD H. HENNEMAN, *University of Virginia*.

PROBLEM: This project was designed to discover the practical limits of speeding up recorded speech without undue sacrifice of intelligibility, as a means of saving time in communication.

SUBJECTS: Male college students; N's of 66, 30, and 24 in three experiments.

PROCEDURE: Employing a chop-splice technique with magnetic recording tape (previously reported), abbreviated speech records were obtained providing various speed-up rates without attendant frequency shift. Two Harvard Psycho Acoustic Laboratory tests were used: Auditory Test No. 14 (spondaic words), and the Sentence Intelligibility Test. Number of words correctly reproduced afforded measures of intelligibility. Three experiments completed have investigated the intelligibility of: (1) discrete words at speed-up rates between 1.67 and 4.0 times the original; (2) discrete words using speed-up of intact tapes (with attendant frequency shift); (3) continuous speech (with the chop-splice technique). Effect of background noise in the subjects' earphones is now under investigation.

RESULTS: As previously reported, intelligibility for single words remained above 90% for presentation rates up to 2.5 times the original, using the chop-splice technique. By contrast, with intact tape speed-up (involving frequency shift) intelligibility dropped to 65% at a speed-up of 2.0. For continuous speech (chop-splice technique), intelligibility did not drop appreciably until a speed-up rate of 2.0 (79%); at 2.3 intelligibility was 61%; at 2.8 intelligibility was 37%.

CONCLUSIONS: Pending further research, the suggestion is clear that human operators are capable of understanding speech at a much more rapid rate than it is usually spoken! A transmission and presentation system that would convert normal conversation into

a condensed speech pattern might effect considerable time-saving in auditory communication. (Slides)

This is a second report of a series of investigations in progress under an Air Force contract at the University of Virginia. This research on aviation communication is being conducted principally by W. D. Garvey.

11:25 AM An audiometer test suitable for group administration over loud-speakers in semi-quiet rooms. JOHN C. WEBSTER, *U. S. Navy Electronics Laboratory, San Diego*.

PROBLEM: To develop a pure-tone audiometer test for screening purposes that (1) involves a minimum of instrumentation and test personnel and (2) can test up to 200 people at one time.

SUBJECTS: 2000 naval recruits and 500 college students.

PROCEDURE: To keep maintenance and installation problems to a minimum, it was determined that the test should be recorded on a phonograph disc and played back over loud-speakers in existing (non-sound-treated) rooms. Using existing group pure-tone tests as a starting point, subjects were tested and alterations made until acceptable reliability and validity standards were met.

RESULTS: The standards were met by the incorporation of the following three innovations: (1) To insure that the sound pressure level be the same at every room position, a warble tone was used instead of the usual steady tone. This reduced the effects of standing waves in the room. (2) To insure reliable measures of threshold, existing test designs were modified. In addition to decreasing the sound pressure level of each successive group of pulses, each pulse within the group was decreased in level. This made every test item a possible determinant of a man's threshold and kept his attention high and his noise output low. (3) To minimize the distracting effects of outside noises, a noise of known spectra and intensity was incorporated into the test. This noise was shaped so that high levels of noise were used at frequencies well above and well below the frequency being tested, and zero level was used in the near vicinity of the test frequency.

These alterations made the test when presented over loud speakers only slightly (and not statistically) less reliable than existing group tests of the pulsed tone variety given over headsets. For screening purposes this test compares favorably to individual pure-tone audiometer tests. (Slides)

11:40 AM A technique for measuring perceptual interference in a scanning task. ROBERT FITZPATRICK, *American Institute for Research*, and ROBERT B. MILLER, *Washington and Jefferson College*.

**PROBLEM:** To develop a technique for evaluating the reduction due to simulated blind flying equipment in safety-pilots' ability to spot other aircraft. The technique was used to compare two specific kinds of equipment: Blue-Amber, which reduces vision by reducing the light level, and Venetian Blind, which occludes parts of the visual field.

**SUBJECTS:** 56 college students with normal vision.

**PROCEDURE:** Since the types of equipment function differently to reduce vision, and since perception is influenced by a number of environmental variables, it was considered necessary to duplicate relevant features of the flying situation. A mockup cockpit fitted with removable amber acetate panels on all 4 windows and Venetian Blind on the left-front window only, and a semicircular cyclorama sky-background structure were constructed.

The experimental task consisted of locating and identifying a series of small visual stimuli, representing distance airplanes, which were presented in the form of "dots" of black thread or masking tape suspended around 180° of the cyclorama. Fifty subjects were tested with individually randomized sets of 30 stimuli, each presented for 10 seconds in successive 30-second intervals. Later, six subjects were tested when viewing only through the critical left-front window.

**RESULTS:** Scores of individuals were highly reliable. When stimuli were viewed through the critical window only, significantly more were spotted through the amber panels. However, when subjects scanned the entire "horizon," there was no difference in response between conditions. The data also supported inferences concerning the ways subjects approached the task. The method appears valuable not only for answering specific practical problems, but also as a means of more thoroughly understanding the broader perceptual variables in a scanning task.

The research was conducted under contract N7onr-37003 with the Special Devices Center of the Office of Naval Research. (Slides)

11:55 AM The influence of positive *g* on reaction time. ALBERT A. CANFIELD, JR., *Northwestern University*.

**PROBLEM:** To determine the effect of increased positive radial acceleration on simple and discrimination reaction time.

**SUBJECTS:** 16 male college students in the simple reaction time study, and 23 similar students in the discrimination reaction time study.

**PROCEDURE:** All experimental data were collected on the human centrifuge. All subjects wore anti-*g* suits during all experimental trials. In the simple reaction time study, the subjects responded to a light or buzzer

signal by pressing a response button on an aircraft control stick. They knew before each trial which of the two stimuli would be presented. The total time to make five reactions at 1*g*, 3*g*, and 5*g* was obtained twice on each of four experimental days. The average of these eight response times served as the basic data of the experiment.

Test equipment similar to that used in the Army Air Forces in World War II was used in the second study. The total time taken to make five discrimination reactions was substituted for the simple reactions above; otherwise the two experiments were designed identically.

**RESULTS OR CONCLUSIONS:** Simple reaction time to both light and sound was significantly longer at both 3*g* and 5*g* than at 1*g*. The reaction time to light was significantly longer than that to sound at all *g* levels. Since blackout involves only the loss of vision, emergency signals should be given in sound. The discrimination reaction time did not vary with the *g* condition. Several hypotheses to account for the obtained results are advanced. (Slides)

#### MILITARY PSYCHOLOGY IV: PERSONNEL

1:40-2:40 PM, Tuesday, White Hall 105

A. G. BAYROFF, Chairman

1:40 PM Oral examinations for proficiency testing.

HOWARD J. HAUSMAN, JOSEPH T. BEGLEY, and  
HOWARD L. PARRIS, *Bolling Air Force Base*.

**PROBLEM:** Among the various methods for assessing worker proficiency, the oral examination seems to have been inadequately explored. For some military jobs the oral examination can be adapted, combined perhaps with demonstration, and become the most satisfactory medium for measuring technical ability. Proficiency measures for such jobs should take into consideration: complex job elements take too long to perform; job equipment is usually unavailable for performance tests; procedures or materials change rapidly, upsetting carefully constructed test items; verbal factors, common in written tests, should not contribute to test results; and in any location, few subjects are tested at one time and examination periods are irregular.

The purpose of this paper is to call attention to the need for the development of the oral examination.

**SUBJECTS:** Aircraft maintenance mechanics specializing on the B-29 at several Air Force bases.

**PROCEDURE:** The examination pattern here described seems to have the advantage of readily testing *knowledge* of approved *technical procedures*. The essentials of the procedure are: (1) all possible areas

of the job are completely covered; (2) the examiner is a technical expert thoroughly familiar with the specific job, and also trained in examination techniques; (3) a standardized examining manual is prepared for the examiner's guidance; he must question the subject more closely when indefinite answers are given to the suggested questions; and (4) the examiner must evaluate the subject's responses to each section of the examination in terms meaningful to the job.

**RESULTS:** Experiment has shown that this technique: (1) has satisfactory reliability (two examiners independently grading the same subject); (2) is relatively free of verbal elements as compared to a written examination covering the same materials; (3) apparently gives more valid assessments for specific job elements than do supervisor ratings; and (4) has shown "customer acceptability." Further work directed toward exploring some of the assumptions and modifying the earlier techniques is proceeding. The approach seems promising.

1:55 PM A preliminary investigation of psychological requirements for arctic duty. ROBERT R. PINKS, *Bolling Air Force Base.*

**OBJECTIVES:** (1) To discover leads and cues for the development of future selection devices and procedures applicable to arctic assignments. (2) To explore the bases for developing a set of criteria of satisfactory adjustment to arctic duty. (3) To validate an experimental battery of selection devices. (4) To explore and evaluate methods and techniques useful in military arctic research. (5) To identify the individuals in a unit who fail to adjust in the arctic and to determine the causes for the failure.

**PROCEDURE:** This investigation consisted essentially of administering a number of experimental psychological tests and questionnaires to a sample of 110 enlisted airmen shortly before their transfer to a chain of arctic Loran stations, with detailed follow-up studies of these men at their respective bases during their tours of arctic duty.

**RESULTS:** Because of certain conditions encountered in the collection of the data, major emphasis was placed upon the identification of selected criterion variables. A number of procedures were explored as potential sources of criterion data, and four factors bearing on adjustment to arctic duty were tentatively identified as: (a) motivation; (b) emotional stability; (c) personal-social relations; and (d) technical proficiency. It was also concluded that (1) the evidence for progressive psychological deterioration with continued duty in the arctic was very slight. (2) individual cases of extreme "success" and "failure" could not be readily identified by statistical analysis

of the data, and, therefore, an individual-clinical approach might better achieve this identification of extreme cases, etc.

2:10 PM An evaluation of the predictive properties of measures of variability of performance on a psychomotor task. ROBERT C. HOUSTON and ROBERT Y. WALKER, *University of Maryland.*

**PROBLEM:** To make an examination of measures of variability of performance in order to evaluate their properties as predictors of performance or variability. **SUBJECTS:** Thirty male university students with normal or corrected to normal vision.

**PROCEDURE:** All subjects were given practice on the S.A.M. Rotary Pursuit Test, the S.A.M. Two Hand Coordinator, and the S.A.M. Complex Coordinator for a combined total of 50 minutes each day for 15 days. Procedure and results for the Rotary Pursuit Test will be presented in this paper. The task was modified to obtain scores in respect to distance from center of target. Scores were recorded for each twenty-second trial. Fifteen trials were given the first day, 20 trials on all other days. Measures of variability were based principally on intra-day variance about the individual's mean performance.

**RESULTS:** Individuals were found to differ significantly in intra-day variability of performance. Based on scores nearest the center, the mean intra-day variance for the group reached its highest level half-way through training. At the end of training, it was slightly lower than on the first day. Correlations of intra-day variances from day to day were low or zero. Variances grouped over periods of several days gave higher inter-correlations. The correlation of variance with performance within individuals ranged from zero to high negative.

**CONCLUSIONS:** There are significant individual differences in variability of performance on the Rotary Pursuit, but conventional methods of analysis indicate that these measures are not sufficiently reliable for use as predictors of performance or variability. Additional analysis of the data now in progress will be reported.

2:25 PM Effects of variations in commentary upon the learning of perceptual-motor tasks from a sound motion picture. JOHN V. ZUCKERMAN, *Stanford University.*

**PROBLEM:** To determine the effects of varying the level of verbalization, personal reference, and phase relationships of picture and sound, in films demonstrating the tying of three common knots upon the performance of the tasks.

**SUBJECTS:** 1787 Navy Seaman Recruits, in their first week of naval training. (Groups of about 60 were tested two at a time.)

**PROCEDURE:** Specially produced experimental motion pictures were shown to the groups. Immediately after a film showing a knot, the performance of the task was required as a test. After a liberal time allowance for tying, the correctly tied knots were counted.

**RESULTS AND CONCLUSIONS:** Three dimensions of commentary variation were explored. (1) Level of verbalization varied from none through low, medium and high. Some verbal description of the acts and relations of knot-tying assists the learner, medium being the most effective, but high verbalization may actually interfere with learning. (2) With a military popula-

tion, directive statements using the imperative mood, or the 2nd person active, are more effective than 1st person active, or 3rd person passive in promoting learning. (3) An exploratory test of phase relationships suggests that sound leading the picture is better than sound lagging. It is possible that the phase relationships are closely related to the level of difficulty and complexity of the task. Further research is needed to ascertain procedures for determining the optimal phase relations of picture and commentary. This work was done under the Instructional Film Research Program of the Pennsylvania State College. (Slides)

## DIVISION ON MATURITY AND OLD AGE

### INTELLIGENCE AND AGING

8:50-9:50 AM, Wednesday, White Hall 105

MORTON SEIDENFELD, Chairman

8:50 AM The measurement of intellectual deterioration in the aged. CHARLOTTE FOX and JAMES E. BIRREN, *National Institutes of Health*.

**PROBLEM:** The purpose of this study was to investigate the agreement of two measures of intellectual loss in 60-69-year-old individuals. The two measures were the Deterioration Quotient (DQ) of the Wechsler-Bellevue Intelligence Scale and the Efficiency Index (EI) of the Revised Examination for the measurement of Efficiency of Mental Functioning, by Babcock and Levy. Both of these tests are used to measure decline from a previous level of intellectual ability.

**SUBJECTS:** A total of 50 subjects were selected from institutions in the Baltimore area. The subjects were in the age range 60 to 69 years, white, native language, English, and they had had four or more years of schooling. They were free of psychoses and of neurological or other disorders which presumably might affect intellectual functioning.

**PROCEDURE:** Case histories and the results of individual interviews were used to screen for age, nativity, education, native language, occupational history, and vision and hearing. Both the Wechsler-Bellevue and the Babcock scales were given to each subject.

**RESULTS:** The deterioration scores of the two tests showed a correlation which was not significantly greater than zero. A measure of normal or expected age loss on the Wechsler-Bellevue: namely, the "Senescent Decline Formula" devised by Copple, showed low correlations with the DQ and EI.

Because direct evidence of the validity of these measures of deterioration is lacking for the age range of this study, it is recommended that differentiation of individuals of this age level should not be attempted

at present by means of the DQ and EI. These results do not bear upon the validity of the tests in detecting deterioration resulting from diseases or trauma in young individuals.

9:05 AM The measurement of intellectual deterioration in senile psychosis and psychosis with cerebral arteriosclerosis. JACK BOTWINICK and JAMES E. BIRREN, *National Institutes of Health*.

(Sponsor, James E. Birren)

**PROBLEM:** The purpose of this study was to compare intellectual deterioration in senile patients institutionalized in mental hospitals with "normal" individuals of the same age, and to compare three indices that purport to measure intellectual deficit.

**SUBJECTS:** A total of 25 senile mental patients diagnosed as senile psychosis or cerebral arteriosclerosis with psychosis were studied. The criteria were designed to select individuals institutionalized because of impairment resulting principally from organic brain changes. All patients were white, between 60-70 years, whose native language was English and who had had a minimum of four years of schooling. Patients were excluded who were suspected of being mentally deficient or having affective disorders without apparent organic changes or who suffered from gross sensory and physical handicaps.

**PROCEDURE:** Each patient was given a detailed screening interview in which the patient's ability to cooperate was assayed. The Wechsler-Bellevue Intelligence Scale and the Babcock-Levy Revised Examination for the Measurement of Efficiency of Mental Function were administered to each patient. The mean deterioration indices were compared with those of a normal population of similar background and with the standardized norms of young people.

**RESULTS:** There was a significant difference of mean EQ, EI, and Senescent Decline Index between the normal aged group and the deteriorated group, but

the difference between the means of the DQ of the two groups was not significant. In general the differences in mean values were greater between the young and normal aged groups than between the aged and deteriorated groups. The exception was the EQ which showed a greater difference between the deteriorated and normal aged than between the normal aged and young standardization groups. (Slides)

9:20 AM An analysis of age changes in rate of performance of simple intellectual tasks. JAMES E. BIRREN, CHARLOTTE FOX, and JACK BOTWINICK, *National Institutes of Health*.

PROBLEM: The purpose of this study was to analyze the rate of performance of young, aged, and intellectually deteriorated subjects when test difficulty is experimentally varied.

SUBJECTS: A total of 195 senior high school students were used to standardize the materials. In addition 111 subjects aged 20 to 69 years, and 30 aged mental patients diagnosed as deteriorated were used to analyze the age changes in the test parameters.

PROCEDURE: Single column addition problems of varied lengths from 2 to 25 digits were used to secure a measure of the rate of addition as a function of the number of digits in the problem. The relation between the rate of addition and the number of digits in a problem was described by a power function of the form:  $Y = a/x^n$ .

RESULTS: Correlations between speed of copying digits and rate of addition showed that the performance of the aged was more frequently limited by speed of writing than that of young subjects. Analysis of the individual curves of speed of addition yielded measures of the rate of addition free of the limitation of speed of writing. The slope of the curve representing the decline of addition rate as a function of the number of digits, after the influence of speed of writing was removed, was significantly different for the young and aged subjects. Intercept values, representing speed of addition at lowest difficulty, did not show a significant change with age.

Because the aged may decline in several rates of performance, it is extremely important to identify in the individual the particular process determining the altered score or measurement. It is suggested that the present method offers a means of differentiating in aged individuals the influences of slow visual perception and simple response time, from the process under investigation. (Slides)

9:35 AM The creative years of long-lived versus short-lived individuals. HARVEY C. LEHMAN, *Ohio University*.

PROBLEM: Since average length of life is increasing, the question may well be raised as to whether this

change is likely to result in a greater average output per individual, in older mean ages at time of contributing, and the like.

SUBJECTS: Large numbers of deceased creative thinkers, whose contributions admittedly have changed modern man's ways of thinking and acting.

PROCEDURE: The contributors were sub-divided upon the basis of their relative longevity. Average output per sub-group, mean age at time of contributing, etc., were computed.

RESULTS OR CONCLUSIONS: With greater longevity: (1) average output is somewhat greater; (2) mean age at time of achievement is greater; (3) the S.D.s of the distributions of the ages are larger; (4) a smaller percentage of total creative output occurs at ages 30 to 39 inclusive; and (5) ages 30 to 39 are the most fruitful as regards creative output both for those who lived to age 85 or beyond and for those who live only to age 50. This latter remark holds true only for creative output of highest merit. It does not hold for mere quantity of output. (Slides)

## ADJUSTMENT IN AGING

10:00-11:00 AM, Wednesday, White Hall 105

JEANNE GILBERT, Chairman

10:00 AM Comparative adaptational, social, and psychometric data on the life histories of senescent twin pairs. FRANZ J. KALLMANN, LISSY FEINGOLD, and EVA BONDY, *Columbia University*.

PROBLEM: Comparison of the life histories of monozygotic and dizygotic samples of fully observed twin pairs over age 60, in order to study the extent of significant similarities or dissimilarities in the capacity of genetically alike and unlike persons for biological adaptation, emotional adjustment, and intellectual performance during the period of senescence. POPULATION: A representative sample of 150 same-sexed twin pairs of either zygosity in the age group 60-95, taken from a consecutive series of over 2000 senescent twin index cases who are being observed till the end of their lives.

PROCEDURE: The histories and performance of monozygotic and dizygotic twin partners have been compared with respect to psychometric test scores, variations in occupational, marital and socio-economic status, the degree of physical and emotional adjustment to aging, and the prospects of survival.

RESULTS: As a rule, the similarities in the test scores, biological adaptabilities, and social histories of monozygotic twin partners considerably exceed those observed in dizygotic twin pairs.

CONCLUSIONS: The ability to survive until the period of senescence, and to adjust to it, seems to be part of the normal equipment of man, and displays many

graded variations within the limits of normality. Apparently this is due to additive effects of a great number of gene units. The manner in which genetically influenced variations in aging and longevity correspond with those in intellectual and adaptational abilities, illustrates the remarkable extent to which genic elements determine a person's variable capacity for maintaining a state of physical and mental health throughout life. (Slides)

10:15 AM Employment and service potentialities of old people. JEANNETTE E. STANTON, *Ohio State University*. (Sponsor, Sidney L. Pressey)

Status and a sense of usefulness are recognized as needed for good adjustment of the aged. With the large and growing numbers of older people, economic productivity of some sort on the part of many of them seems economically necessary. Investigation of this problem so far has, for the most part, centered on the unemployed and has tended to deal with those in the lower socio-economic groups. The present study has attempted instead to find instances of demonstrated usefulness in the older years, and especially in the middle and upper classes.

The material consists of (a) reports from over 1,000 students, in classes in psychology in which there was discussion of this issue, regarding older people they had known who have done work for pay and unpaid service-type work; (b) case studies of old people considered successful in adjustment in old age, prepared by students of similar interests and background; (c) cases found to be employed, in a survey of certain businesses with special reference to older workers.

It has been found that in certain types of business, employment of older people is rather common and successful (thus older clerks may be more successful than younger people in selling to older customers). Also ingenious old people have discovered a great variety of part-time jobs and forms of self-employment which they can do and which are needed in most communities. Further, old people have found many types of service which they can render to their families and neighborhoods.

In total, it is concluded that potentialities for usefulness in the older ages have been commonly underestimated, and that when they are investigated and listed, the result is of distinct value in counselling old people.

10:30 AM The relationship of several psychological and socio-economic characteristics and the activities and interests of senescents in New York City. LEO CHALFEN, *Kings County Hospital*.

**PROBLEM:** The purpose of this investigation was to compare the extent and the nature of the leisure-time activities and interests of persons 65 years of age or more residing in homes for the aged or attending recreation centers in New York City, and to compare the association of certain psychological and socio-economic characteristics with these activities and interests.

**SUBJECTS:** Stratified-random samples from two distinct milieus were interviewed individually, 108 persons in seven old-age homes and 108 persons in seven recreation centers for the aged. The subjects were over sixty-five years of age and varied in sex, race, religion, occupation, employment status, desire for employment, education, living arrangements, birth-place, rural or urban upbringing, economic identification, and marital status.

**PROCEDURE:** The subjects were interviewed individually with the aid of a questionnaire which covered the extent and nature of the activities participated in often and the activities desired—the interests. The favorite activities and interests were elicited and the intensity of liking and the time related to each were ascertained. Obstacles barring participation in various pursuits were catalogued.

**RESULTS OR CONCLUSIONS:** Three general conclusions stand out. (1) The center and home populations differ more in the extent and nature of activities than they do in interests, where few significant differences occurred. Situational rather than personal differences seem to account for the disparity between the groups. (2) The center group is better adjusted in the leisure-time area. (3) Those of high socio-economic status are more dependent upon themselves, whereas those of low socio-economic status are more dependent upon the environment and on others for leisure-time gratification.

10:45 AM Attitudes toward retirement and old age. WAINWRIGHT D. BLAKE, *Bucknell University*.

**PROBLEM:** An attempt to find the attitudes toward aging, of adults of all ages in certain categories.

**SUBJECTS:** The subjects are adults from 35 years of age upwards. At the present time, between 300 and 400 have been used. Possession of the proper age is the only criterion used in selection. No distinction has been made relative to sex, race, color, creed or other differences. A small group of young adults is being interviewed in an attempt to study possible changing of attitudes due to age.

**PROCEDURE:** For the collection of all data up to the present, interviewers were used. The great majority of cases were members of the psychology department seminar on maturity and old age. The interviewers noted the answers to questions relative to attitudes

toward (a) retirement, (b) growing old, (c) difficulties which may show up in retirement, (d) leisure time activity when old, (e) possibility of curtailment of activities, (f) companions in retirement, and (g) the place of church and religion. The assembled data were organized into two groups of categories: (1) the socio-economic, which includes unskilled workers, semi-skilled workers, semi-professional workers, and professional and executive; (2) varying age groups, which includes 35 to 44 years, 45 to 54 years, 55 to 59 years, 60 to 64 years, 65 to 69 years, and 70 years and over. Further combinations, such as those based on sex, marital status, etc., are being made for study purposes.

**RESULTS:** As yet, trends and tendencies are not sharply defined and, in most areas, not too distinct. One thought that appears to show up is that the great majority of adults expect their closest companion in old age to be their spouse. Other tendencies seem to indicate, at least at this time, a lack of any increase in religious activity. There is a trend, which may or may not be definitely established later, toward a fatalistic attitude toward ageing. Any of these trends and tendencies may be changed materially upon the accession of more data.

### PERSONALITY IN AGING

11:10 AM-12:25 PM, Wednesday, White Hall 105

HARVEY LEHMAN, Chairman

11:10 AM Expansion and constriction of life activities during the adult life span as reflected in civic and political participation. RICHARD TRUMBULL, C. ROBERT PACE, and RAYMOND G. KUHLEN, *Syracuse University*.

**PROBLEM:** Maturing and aging during the adult life span may be described as following a pattern of emerging responsibility and activity, maintenance of activity on a plateau, followed by constriction of activity and relinquishment of responsibility. These changes, and the shift in cultural roles thus implied, represent important aspects of the aging process. The purpose of this paper is to present some quantitative data on the extent to which, and the ages at which, such trends occur.

**SUBJECTS:** In the fall of 1947 *Time Magazine* sent a questionnaire to practically all college graduates in the United States whose surnames began with "Fa." A 59 per cent response totaled some 9,000 cases. Respondents included members of the classes of 1879 through 1947, thus roughly, ages from early 20's through 90.

**PROCEDURE:** Evidence regarding participation in political and civic activities seems appropriate to describe the trends outlined above, since acceptance and

relinquishment of such activities are relatively voluntary, in contrast (for example) to involuntary relinquishment of job responsibility. Data were analyzed according to year of graduation, which probably closely reflects chronological age.

**RESULTS:** Expansion and constriction of life activities are clearly apparent in the present data. The main features are the relatively long period over which expansion continues, and the late age to which activities persist. Civic (local community) participation appears to increase until the early 40's and then to decline, whereas political activities (voting, reading and discussing politics, sending telegrams) increase until about 50, and are maintained until very old age before any decline is apparent. Age at which "decline" begins seems related to amount of initiative and energy involved in the activity. Detailed age trends for individual activities will be presented in mimeographed "handouts."

11:25 AM A comparison of factors in the personal adjustment of old people in Protestant church homes for the aged and of old people living outside of institutions. JU-SHU PAN, *University of Chicago*. (Sponsor, Robert Havighurst)  
(Abstract exceeded 300-word limit.)

11:40 AM Personality characteristics of the institutionalized aged. HELEN H. DAVIDSON and LORRAINE P. KRUGLOV, *The City College*.

**PROBLEM:** What are the personality characteristics of the aged who live in institutions? What are the differential effects of the ageing process on personality?

**SUBJECTS:** The sample consists of 32 people (10 men and 22 women) residing in a Hebrew home for the aged. The subjects, ranging in age 61 to 87, represent varying cultures and economic levels.

**PROCEDURE:** The Rorschach test was administered individually to each subject as part of an evaluation process. The results were analyzed quantitatively and qualitatively and compared with results obtained with other groups of the aged, and also with personality patterns obtained in the general population. In addition, the differences in patterns among individuals in the sample were studied to determine the differential effects of the ageing process on personality.

**RESULTS:** The old people in this study show personality characteristics which differentiate them from a group of younger adults as well as from a group of old people who are living at home. These characteristics are marked constriction, little interest in the world outside, withdrawal into a kind of fantasy, intellectual deterioration, and strong feelings of inadequacy. Nevertheless, individual variation is evident, and possible reasons for these variations will be discussed.

11:55 AM Personality and social roles in old age.

RUTH ALBRECHT, *University of Chicago*. (Sponsor, Robert Havighurst)

**PROBLEM:** The problem was to measure the relationship between the social roles of old people and their personal adjustment.

**SUBJECTS:** By the proportional stratified sampling method, 100 subjects were selected representing a Midwestern community population of people over 65 according to age, marital status, sex, and social class positions.

**PROCEDURE:** Three measuring instruments were used: (1) A Role-Activity Scale was constructed to rate activity on a ten-point scale within these role-areas: parental, kinship, home-making, and in organizations, church activities, peer relationships, civic activities, and occupation. (2) A Personality Register was devised to rate elderly people on the characteristics generally ascribed to aging: cantankerousness, impulsiveness, interest in the past, mental lapse, unhappiness, and withdrawal. (3) The Cavan Scale of Social Adjustment Ratings for Later Maturity was used to rate the degree of integration into social life and to rate attitudes significant for adjustment in these years.

Information was obtained by interviewing each subject. A schedule was used for detailed information, and the focused interview for deeper feelings and attitudes. Additional information of value was gathered from newspapers, observation, membership lists, and community informants. Each subject was rated on each scale by the interviewer and by 3 independent judges. The composite scores were used for further statistical analysis.

**RESULTS:** A number of significant differences was found between groups defined on the basis of marital status, age, and social class. Significant correlation coefficients were found to exist between a large number of the social and psychological factors studied.

12:10 PM Early childhood memories of mental patients. ALICE FRIEDMANN, *VA Mental Hygiene Clinic, New York*.

**PROBLEM:** The investigation of reports of early childhood memories has been a prerogative of psychoanalytic technique. A possibly useful diagnostic tool, the patient's report of childhood memories, has not received sufficient attention on the part of the examining psychologist. In this study an attempt was made to examine childhood memories of mental patients with a view to diagnosis and presenting symptom(s).

**SUBJECTS:** Patients of an out-patient clinic referred for psychological work-ups were subjects of this study. Fifty cases were investigated with regard to early memories.

**PROCEDURE:** In the course of the administration of a

battery of tests the patient was also presented with 5 questions pertaining to early memories. (1) Do you remember the time when you were a child? (2) What is your first childhood memory? (3) Do you remember when your brother was born? (Alternative question, "What do you remember about your brother, sister, friend?") (4) Do you remember your first day in school? (5) How was it when you tried to swim (skate) the first time?"

**RESULTS AND CONCLUSIONS:** The report of early childhood memories, in many instances, contains manifold affinities with psychological material elicited in projective testing. This pertains to both content and dynamics. Early memories of neurotic and psychotic patients seem to differ in dynamics and content. Early memories seem to be crystallized around features which may be characteristic of types of mental disorders.

In broad terms results may be summed up as follows: (a) The early memory of the neurotic patient seems to portray an attitude of cautious withdrawal. (b) The early memory of the psychotic seems to indicate a clash with reality. These observations collected on a limited number of cases must be confirmed by large scale studies. Even now, they are of some value to the examiner in the formation of a diagnostic impression.

### MENTAL DETERIORATION: ITS MEASUREMENT AND SIGNIFICANCE

1:40-3:50 PM, Wednesday, White Hall 105

GEORGE LAWTON, Chairman

Participants: DAVID WECHSLER, JEANNE GILBERT, HERMAN FEIFEL, and WALTER R. MILES

### BUSINESS MEETING

4:00-5:00 PM, Wednesday, White Hall 105

GEORGE LAWTON, President

### SYMPOSIUM: NEEDED RESEARCH IN MATURITY AND OLD AGE: SUGGESTIONS FROM CHILD DEVELOPMENT STUDIES

1:40-3:50 PM, Thursday, Sparks 316

(Co-sponsored with Division 7. See Division 7's program.)

### DINNER AND PRESIDENTIAL ADDRESS

6:00-8:00 PM, Thursday, State College Hotel

GEORGE LAWTON. *Psychotherapy in Middle and Late Maturity*

## RELATED GROUPS

**PSYCHOMETRIC SOCIETY****BUSINESS MEETING, PSYCHOMETRIC CORPORATION**

8:00 PM, Monday, Willard 108

**STATISTICAL CONSIDERATIONS**

1:40-2:40 PM, Tuesday, Carnegie 3

(Co-sponsored with Division 5. See Division 5's program.)

**TEST PARAMETERS**

2:50-3:50 PM, Tuesday, Carnegie 3

(Co-sponsored with Division 5. See Division 5's program.)

**CRITERIA ANALYSIS**

4:00-5:00 PM, Tuesday, Carnegie 3

(Co-sponsored with Division 5. See Division 5's program.)

**BUSINESS MEETING**

5:00-6:00 PM, Tuesday, Carnegie 3

DOROTHY C. ADKINS, President

**DINNER AND PRESIDENTIAL ADDRESS**

6:00-8:00 PM, Tuesday, Nittany Lion Inn

DOROTHY C. ADKINS, President

**FACTOR ANALYSIS: PROBLEMS AND RESULTS**

8:50-9:50 AM, Wednesday, Little Theatre

(Co-sponsored with Division 5)

M. W. RICHARDSON, Chairman

8:50 AM Problems in the factor analysis of tests of varying difficulty. JOHN B. CARROLL, *Harvard University*.

**PROBLEM:** It has been shown previously that Pearsonian correlations do not reflect the true correlation between underlying trait continua when the variables are dissimilar in difficulty and are affected by the element of chance success by guessing. It was desired to develop means for estimating these true correlations, since unbiased correlations are desired in cor-

relation matrices to be used in factor analysis. The solution to this problem is dependent upon a number of fundamental issues in the theory of measurement. **PROCEDURE:** An analysis of the ten sub-tests of the original Seashore Sense of Pitch test was performed on data from 1204 subjects. Previously developed methods for estimating true correlations between the sub-tests were modified to account for all aspects of the data and empirically verified. Use was made of the "quantal hypothesis" of psychophysics.

**RESULTS:** True correlations between the underlying continua of tests varying in difficulty can be estimated by the use of the tetrachoric coefficient after cell values have been corrected for chance success. The Sense of Pitch Test measures only one common trait according to these results. Implications of the results in conducting factorial studies are considered. Further problems in the rationale of this procedure are indicated.

9:15 AM The factorial composition and validity of a speeded test. CHARLES T. MYERS, *Educational Testing Service*.

**PROBLEM:** To discover the factorial relationship between working speed and level of ability in a non-verbal reasoning test, and to find the rate of speed with the highest validity for predicting grades at a college.

**SUBJECTS:** 800 newly admitted students.

**PROCEDURE:** Figure classification tests with ten, twenty, and thirty items were administered with twelve-minute time limits. Each of the men took five different tests including at least one at each speed level. Four forms of the test were arranged and administered to equivalent groups so that at least one of the groups would start at each of the different speed levels, and so that alternate-form reliability coefficients could be computed for each test. A number of different scores were obtained including scores for the number right on each of the three pages of the thirty-item tests, the number wrong, and the number not reached. Correlations were found between these scores and also with grades in the first year's work at the college. These intercorrelations were analyzed by factorial methods. Two factors were sufficient to account for most of the intercorrelations of test scores and for most of the validity of the tests. **RESULTS OR CONCLUSIONS:** The ability to answer the problems correctly had a slight negative correlation with the tendency to answer the problems quickly, and vectors for the criterion scores had their projec-

tions between those of the unspeeded and the moderately speeded tests.

9:30 AM A factor analysis of English readers. WARREN S. TORGERSON and BERT F. GREEN, JR., *Educational Testing Service*.

One application of the factor analysis of correlations between persons has been in the study of examiners' grades. If grades have been given to a number of individuals by a number of examiners, where all the examiners appraise the same product of each individual, the examiners may be considered as tests of the individuals or the individuals as tests of the examiners. The analysis of correlations between persons is also pertinent to the problem of achievement test validity. The intrinsic validity of an achievement test is often known only through the judgments of experts in the area. One may, however, examine the interrelationships of the judgments of these experts. This investigation relates both to the intrinsic validity of an achievement test and the nature of examiners' marks. The specific purpose was to investigate the possible presence of schools of thought among English essay readers concerning an English Composition test.

Thirty-eight essays were selected from responses to the essay question on the April 1947 College Entrance Examination Board English composition test. The essays were selected so as to secure essays that varied widely in quality. Twenty English essay readers were selected so as to secure a large range of reader reliabilities. Nine were college and eleven were secondary school English teachers.

Inverted multiple factor analysis was used to examine the 20 x 20 matrix of correlations of English essay readers, based on 38 essays. The centroid reference axes were then rotated to a simple structure.

A large general factor indicated considerable agreement among the readers. Three weak group factors suggest the existence of consistent schools of thought concerning the quality of English essays, although it is possible that they were due to chance groupings. The intrinsic validity of this essay is discussed.

#### SYMPOSIUM: THE NEED AND MEANS OF CROSS VALIDATION

10:00 AM-12:10 PM, Wednesday, Little Theatre

(Co-sponsored with Division 5)

CHARLES I. MOSIER, Chairman

Participants: HARRY H. HARMAN, RAYMOND A. KATZELL, E. E. CURETON, and ROBERT J. WHERRY

#### CORRELATION: METHODS, RESULTS AND INTERPRETATIONS

1:40-2:40 PM, Wednesday, Little Theatre

(Co-sponsored with Division 5)

DONALD E. BAIER, Chairman

1:40 PM A punched card intercorrelation method. PHILIP H. DuBois, *Washington University*.

When variables are coded in not more than nine steps (as with stanines), sums required for intercorrelations can be readily obtained by a modified method of selective digitizing.

Counters are laced into two banks, with assigned values of 1 and 3. The value of the variate in the control or multiplier variable determines, the bank or banks into which multiplicand values are to be added, or out of which they are to be subtracted. Thus, with a 9 in the control variable, all values are to be added in both banks; with an 8, only in Bank 3; with a 7, values are added in Bank 3 but subtracted out of Bank 1, etc.

The method is applicable to any tabulator equipped with a digit selector and direct subtraction. Neither the progressive total feature nor a summary punch is required. No sorting of the cards is involved.

Formulas are given by which the sums printed on the tape at the end of the run for a given variable are readily converted into sums of squares and sums of cross products. Correlation formulas can be modified to reduce the conversion operations.

When the number of variables is not greater than 10 and an 80-counter tabulator is used, the method is considerably faster than conventional methods of progressive digitizing. It is competitive up to 20 variables. Beyond 20 variables, progressive digitizing would ordinarily be preferred (when a summary punch is available) because of the more efficient use of counter capacity.

1:55 PM An empirical investigation of the extent to which biserial and tetrachoric correlations approximate the product moment coefficient. BERTHA P. HARPER and HARRY H. HARMAN, *Personnel Research Section, AGO*.

PROBLEM: Biserial and tetrachoric correlation coefficients are often computed assuming basic conditions are met for these statistics (dichotomized variable is derived from a continuous variable, normally distributed and linearly related to the other variable). Two examples were studied to illustrate that data readily accepted as meeting these assumptions may fail to do so; and deviations of the biserial and tetrachoric coefficients from the product-moment were determined.

**PROCEDURE:** From data available in the Personnel Research Section, a technician selected two variables with high correlation, two variables with low correlation. Important considerations in selecting data were that the variables be linearly related and normally distributed, as far as could be observed from distributions of the scores. The Pearson product moment correlation coefficient for the "high" set was .80, for the "low," .25. Biserial coefficients were computed for various points of cut on each variable. Similarly, tetrachoric coefficients were computed for different points of cut on both variables. Biserial and tetrachoric coefficients were compared with the Pearsonian values. More exact mathematical tests were made of the extent to which the data met basic assumptions.

**RESULTS:** Although these distributions would have been accepted as essentially normal by most technicians, the Chi square test gave evidence for rejecting this hypothesis.

Magnitude of discrepancies between biserial coefficients and the Pearsonian varied with the deviation of the "cut" from 50%. For tetrachoric coefficients, the farther the "cut" from 50%, on either or both variables, the greater the deviation from the predetermined value.

**CONCLUSIONS:** Basic assumptions underlying use of biserial and tetrachoric correlation coefficients may not be met in data which have overt appearance of satisfying them; in situations such as reported here, considerable deviation from the product moment coefficient may occur; deviations tend to increase as the "cut" approaches extremes of the distributions.

2:10 PM Estimation of the reliability of ratings.

ROBERT L. EBEL, *State University of Iowa.*

The problem considered in this paper is the estimation of the reliability of ratings in the general case where  $k_1, k_2, \dots, k_n$  ratings of some trait are available for each of  $n$  subjects, and in the special case where a complete set of ratings from each of  $k$  sources is available for each of the  $n$  subjects.

Using the statistics of analysis of variance it is possible to obtain either a unique estimate of the desired reliability coefficients, or a confidence interval which indicates the precision of the estimate.

A previously published formula for the general case is shown to be slightly biased. Another published formula for the special case yields results identical with those obtained from this formula, but has the disadvantage of requiring special and less routine computational procedures, and of providing no convenient estimate of its precision.

The conditions under which this formula yields results identical with those obtained from the basic formula for rectilinear correlation are made explicit.

2:25 PM Expectancy tables and abacs: their uses and limitations. WALTER V. BINGHAM, *Washington, D. C.*

An "expectancy" is defined as the a posteriori probability that an individual whose score in a test battery or other predictor is known, will attain or surpass a designated level of achievement on the scale of the educational or occupational criterion against which the predictor has been validated.

This meaning of the term is of use not only to employers and admissions officers when appraising the relative promise of competing applicants; it is invaluable when a counselor is making clear to a client what his test scores mean. The client asks, "What are the odds?" A counselor with the necessary abacs and tables of expectancy at his elbow is in a position to give an intelligible and informative reply, without exaggerating the significance of the ascertained expectancies.

(For reasons not exclusively mathematical, the letter  $E$  rather than  $p$  is used to symbolize a person's expectancy of achieving at least such-and-such a cut-off score on the criterion scale.)

Three examples of recently prepared expectancy tables and abacs are presented and described. Precautions to be observed when making use of such expectancies in counseling are emphasized.

The scandalous neglect of this topic in currently available books on psychological statistics is drawn to the attention of authors with a plea that in their next revised editions, when expounding the topic of probability, they treat fully, lucidly, and with judicious conservatism the meaning of an individual score on a validated test, with detailed directions to be followed in computing expectancies and constructing tables, abacs and expectancy cards for the use of employers and counselor as well as research psychologists, while elucidating both the limitations and the real significance of probabilities of individual accomplishment estimated from test performance.

## SYMPOSIUM: PROBLEMS IN DIFFERENTIAL CLASSIFICATION

2:50-5:00 PM, Wednesday, Little Theatre

(Co-sponsored with Division 5)

REIGN H. BITTNER, Chairman

Participants: RICHARD H. GAYLORD, ROBERT L. THORNDIKE, and others.

# METHODOLOGICAL PROBLEMS

8:50-9:50 AM, Thursday, Little Theatre

(Co-sponsored with Division 5)

RAYMOND A. KATZELL, Chairman

8:50 AM Properties of test scores expressed as functions of the item parameters. FREDERIC M. LORD, *Educational Testing Service.*

The bivariate distribution of test scores and scores on the common factor of the test items is derived as a mathematical function of the usual item parameters for the case where: (1) the test score is the number of items answered "correctly"; (2) the multivariate distribution of responses to the test items is of such a nature that it could have arisen from a normal multivariate distribution of abilities in the group of examinees tested (an alternative condition is that the item characteristic curve is a normal ogive); (3) the matrix of tetrachoric item intercorrelations has a rank of 1. It is always possible to check empirically whether or not any given set of actual data conforms to these conditions.

Mathematical expressions are presented for: (1) the univariate frequency distribution of the test scores; (2) the standard error of measurement for examinees at any given level of ability; (3) the regression of test scores on ability; (4) an index of the discriminating power of the test for individuals at any given level of ability. The measure of "ability" is here taken to be the common factor score. (It may be shown that for an infinitely long test the common factor score is identical with normalized true score.)

The following generalizations are made from the formulas: (1) the regression of test score on ability score is never linear, although under certain stated conditions it may be approximately so; (2) rectangular and U-shaped distributions of test score may be obtained if the items have tetrachoric intercorrelations of 0.50 or more; (3) the standard error of measurement is smallest for those individuals for whom the test is *least* discriminating; (4) if a test is to be used only for selection or rejection of the examinees, all items should be of equal difficulty.

9:10 AM A general solution for the latent class model of latent structure analysis. BERT F. GREEN, JR. *Educational Testing Service.*

Latent structure analysis, as recently proposed by Lazarsfeld, is a mathematical model for analyzing responses to items in an attitude questionnaire in terms of characteristics of an assumed underlying attitude variable and associated item characteristics.

In the latent class model it is assumed that the underlying attitude has a point distribution. Using the fundamental assumption that all items are related only because of mutual relationship to the underlying attitude variable, equations relating the latent parameters of the model to the manifest data may be written. In matrix notation the equations are of the form  $P_r = AD_rA'$ .  $P_r$  is any joint occurrence matrix,  $D_r$  is a corresponding diagonal matrix, and  $A$  is the latent parameter matrix, with  $r+1$  rows and  $m$  columns ( $r$  = no. of items,  $m$  = no. of latent classes).

The general solution of these equations consists of factoring two joint occurrence matrices and considering the necessary relationships between the factor matrices. The solution is valid under the conditions that  $m \leq r+1$ , that the columns of  $A$  are linearly independent and that the diagonal elements of a certain  $D_r$  are all different and non-zero; these conditions will usually be fulfilled. The solution assumes that estimates are available for the elements with recurring subscripts in the joint occurrence matrices, such as  $p_{ii}$ ,  $p_{ij}$ , and  $p_{iii}$ . Some alternate methods of obtaining these estimates are considered, the problem being analogous to that of the communalities in factor analysis. Finally a method is indicated for calculating a certain joint occurrence matrix needed in the solution.

9:35 AM A new rotational approach in multiple-factor analysis. W. A. GIBSON, *University of Chicago.*

Once a good set of communalities is made available, the original correlation matrix can be converted into a table of test vector inter-cosines simply by dividing through both columns and rows of the R-matrix by the corresponding vector lengths, which are the square roots of the associated communalities. Test vectors which are near the primary vectors of the simple structure will have a relatively large number of low inter-cosines (high angular separations) with other vectors in the configuration. In particular, a test vector near one primary has to be strongly separated from any test vector which is close to another primary. With these criteria it is possible to pick a set of test vectors to serve as trial primaries for the configuration. By normalizing the rows in the orthogonal factor matrix corresponding to the chosen vectors, we obtain a square matrix  $T$  which shows the projections of the trial primaries on the orthogonal reference frame. By computing the inverse of  $T$  and normalizing it by columns, we get an oblique transformation matrix which defines the reference frame associated with that set of trial primaries. If simple structure exists, and if a good set of trial primaries

has been chosen, then the resulting oblique factor matrix will, in one move, resemble the final one in all essential respects. This technique has been tried out on several sets of factorial data with good results. It is a step toward single move rotational utopia in multiple-factor analysis.

#### **SYMPOSIUM: THE DISCRIMINANT FUNCTION IN PSYCHOLOGICAL RESEARCH**

10:00 AM-12:10 PM, Thursday, Little Theatre

(Co-sponsored with Division 5)

PHILIP J. RULON

Participants: to be announced

#### **SOCIETY FOR PROJECTIVE TECHNIQUES**

##### **BUSINESS MEETING**

4:00-5:30 PM, Tuesday, Sparks 316

##### **RORSCHACH**

10:00-11:00 AM, Wednesday, Auditorium

(Co-sponsored with Division 12. See Division 12's program.)

#### **SYMPOSIUM: INTERPRETING THE TAT**

1:40-3:50 PM, Wednesday, Auditorium

(Co-sponsored with Division 12. See Division 12's program.)

#### **CONTRIBUTED PAPERS**

4:00-6:00 PM, Wednesday, Sparks 316

ROBERT HARRIS, Chairman

#### **SYMPOSIUM: SELECTION OF HYPOTHESES FOR EXPERIMENTAL INVESTIGATION IN PROJECTIVE METHODS**

4:00-6:00 PM, Thursday, Sparks 316

ERNEST R. HILGARD, Chairman

#### **MEETING OF REPRESENTATIVES OF REGIONAL ORGANIZATIONS**

8:50-9:50 AM, Friday, Sparks 10

#### **CONTRIBUTED PAPERS**

4:00-6:00 PM, Friday, Sparks 10

ROBERT HARRIS, Chairman

#### **PRESIDENTIAL ADDRESS AND DINNER**

6:30 PM, Friday, Nittany Lion Inn

A. I. HALLOWELL, *The Use of Projective Techniques in the Study of the Socio-Psychological Aspects of Acculturation*

#### **INTERNATIONAL COUNCIL OF WOMEN PSYCHOLOGISTS**

##### **BOARD OF DIRECTORS MEETING**

1:40-5:00 PM, Sunday, Willard 109

GLADYS C. SCHWESINGER, President

##### **LUNCHEON**

12:00 M, Monday, State College Hotel

##### **BUSINESS MEETING**

1:40-5:00 PM, Monday, Osmond 110

#### **SYMPOSIUM: INTERNATIONAL FRONT-PSYCHOLOGISTS, UNITE!**

8:00-9:00 PM, Monday, Sparks 121

GLADYS C. SCHWESINGER, Chairman

Participants: S. BENET, OTTO KLINEBERG, ROBERT B. MACLEOD, and WALLY REICHENBERG-HACKETT

#### **LUNCHEON, BUSINESS MEETING, AND CONTRIBUTED PAPERS, PSI CHI**

12:30-3:30 PM, Tuesday, Nittany Lion Inn

KENNETH L. SMOKE, President

#### **DINNER: NEW YORK STATE PSYCHOLOGY INTERN TRAINING PROGRAM**

6:00-8:00 PM, Tuesday, State College Hotel

#### **LUNCHEON HONORING TRUMAN LEE KELLEY**

12:10-1:30 PM, Wednesday, Nittany Lion Inn

**LUNCHEON: OHIO STATE UNIVERSITY  
ALUMNI**

*12:10-1:30 PM, Wednesday, State College Hotel*

**AMERICAN CATHOLIC PSYCHOLOGICAL  
ASSOCIATION**

*1:40-6:00 PM, Wednesday, Horticulture 100*

Business Meeting and Discussion

Topic: Problem Areas in Undergraduate Psychological Training

WILLIAM C. BIER, Executive Secretary

**DINNER HONORING WALTER V.  
BINGHAM**

*6:00-8:00 PM, Wednesday, Nittany Lion Inn*

**LUNCHEON: NORTHWESTERN  
UNIVERSITY ALUMNI**

*12:10-1:30 PM, Thursday, Nittany Lion Inn*

**LUNCHEON HONORING MARTIN L.  
REYMERT**

*12:10-1:30 PM, Thursday, State College Hotel*

**LUNCHEON: UNIVERSITY OF CHICAGO  
ALUMNI**

*12:10-1:30 PM, Thursday, State College Hotel*

**SYMPOSIUM: GROUP BEHAVIOR  
RESEARCH**

*4:00-6:00 PM, Thursday, Willard 106*

ROBERT L. FRENCH, Chairman

Anyone active in research in the area of group behavior is invited for an informal discussion of current research problems.

**THE PSYCHOLOGICAL CORPORATION**

*1:40-2:40 PM, Friday, Osmond 117*

Conference on the Use of the Miller Analogies Test in Graduate Selection

HAROLD SEASHORE, Chairman

**THE AMERICAN BOARD OF EXAMINERS  
IN PROFESSIONAL PSYCHOLOGY**

*4:00-6:00 PM, Friday, Auditorium*

Open Meeting

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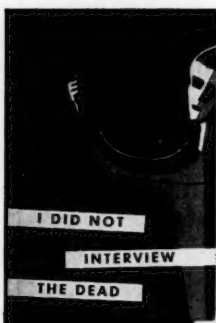
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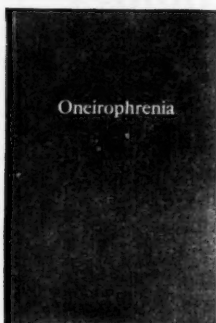
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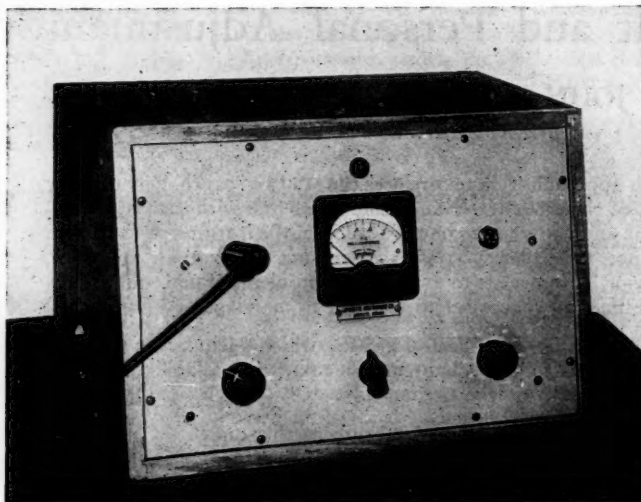
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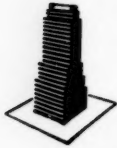
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